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Life Preserving Railroad Car.

THERE is now being built at the Novelty Iron Works in this city, a life preserving car, a model of which was on exhibition at the late Fair of the American Institute, which, if fully equal to the performance of what is claimed for it, is a decided advance on the present mode of getting up railroad carriages. The system of construction is altogether new. The material used is soft steel rods, connected together with malleable iron, wrought iron, or steel tie-blocks, which rods are in one piece—both those running transversely as well as lengthwise—thus bringing fully into action their inherent tensile strength. The tie-blocks are also in one piece, by which arrangement the parts at the intersection of the cross-ribs with the longitudinal sills at the bottom of the frame are greatly strengthened. The design of constructing cars after this method is to prevent the loss of life which so frequently happens by their splintering and destruction in case of collision, or when they are, owing to any cause, thrown from the track. The soft steel rods, of which the frame is made, it is claimed, will not break at all by bending, as wood, cast iron, etc., are sure to do; but when they yield must be literally torn asunder, a most difficult matter, considering the arrangement pursued in constructing the car. The vehicles thus constructed will be also fire-proof, a desideratum that, in view of the amount of life which has been destroyed by burning cars, is anxiously sought for. An internal and external covering conceal the rods from view, and the interspaces between these are filled with a non-combustible, non-conducting substance. If the claims put forward in behalf of this new style of car prove to be well founded, it may reasonably be inferred that, when this mode of construction shall be carried out, the evil effects of accidents on our railroad lines will be reduced to a fraction, as well for the security of travellers as for the indestructibility of the rolling stock. The inventor of this new style of car is Mr. B. J. LA MOTHE, of this city.

Peat Manufacture in Ohio.

ACCORDING to a writer in *Putnam's Monthly* for November the following is the method employed in the manufacture of peat, near Ravenna, Ohio:

"The peat is dug to a depth of from eight to fifteen feet with shovels and slanes, the latter being a kind of spade, with a wing at the side bent at right angles with the blade, so as to form two sides of a square, and loaded into dump-cars which are drawn up an inclined plane upon iron rails by friction gearing, and the contents rapidly emptied into an immense hopper containing one hundred and fifty tons of crude peat. At the bottom of the hopper is a large elevating belt, running over drums upon which the peat is thrown and rapidly carried into the condensing and molding machine. Two men are all that are required to keep the machine full. The condensing and manipulating machine is run by steam-power. It receives the crude peat from the elevating belt in a wet or moist state, and delivers it in a smooth, homogeneous condition, through ten oval-shaped dies, each 3¾ inches by 4¾ inches in area, from which is delivered on drying racks passing horizontally under the machine. Each rack is 26×72 inches, constructed of light pine, holding five bars or canes of peat, which when dry, will yield, to each rack, from thirty to sixty pounds of fuel, according to the density of the peat. The racks are carried from the machine on an inclined tramway made of light friction wheels, so that the racks will almost glide from their own gravity. These racks are taken from the tramway and set up like an inverted V, on the drying ground, where, being exposed to the sun, and the air circulating freely around and between the bars, they dry in from ten to twelve days, and are ready to be loaded into cars for shipment and use. The distance between the legs or base of the V being the same as their length, the drying ground is greatly economized. An acre will hold about five thousand of these racks, from fifteen thousand to twenty thousand being a requisite complement for the machinery. Sixteen men and ten boys on the rackway will make eighty tons of prepared fuel per diem—indeed, there is hardly a limit to the capacity of the machinery if labor enough is employed. With thirty-seven men digging and clearing off the racks from the tramway, one hundred and fifty tons of dried fuel can be made per day. This fuel can be delivered at a less price than the best coal, and the cost of preparing it for market is lighter than that required in coal mining. It can be afforded as low as $4 50 per ton, and even lower, within a reasonable distance from the bogs, and it is more economical than coal. An analysis of the surface peat of this bog gives the following result: carbon, 68 per cent.; oxygen, 18; water, 16, and ash, 3.68 per cent. It also contains ammonia, acetate of lime, fixed and volatile oils. The deeper the peat found, the richer is it in carbon, and there are portions of the bog which will yield 70 to 75 per cent. of carbon. The average amount of carbon thus far, ascertained by analysis of the various peat bogs of the United States, equals 50 per cent."

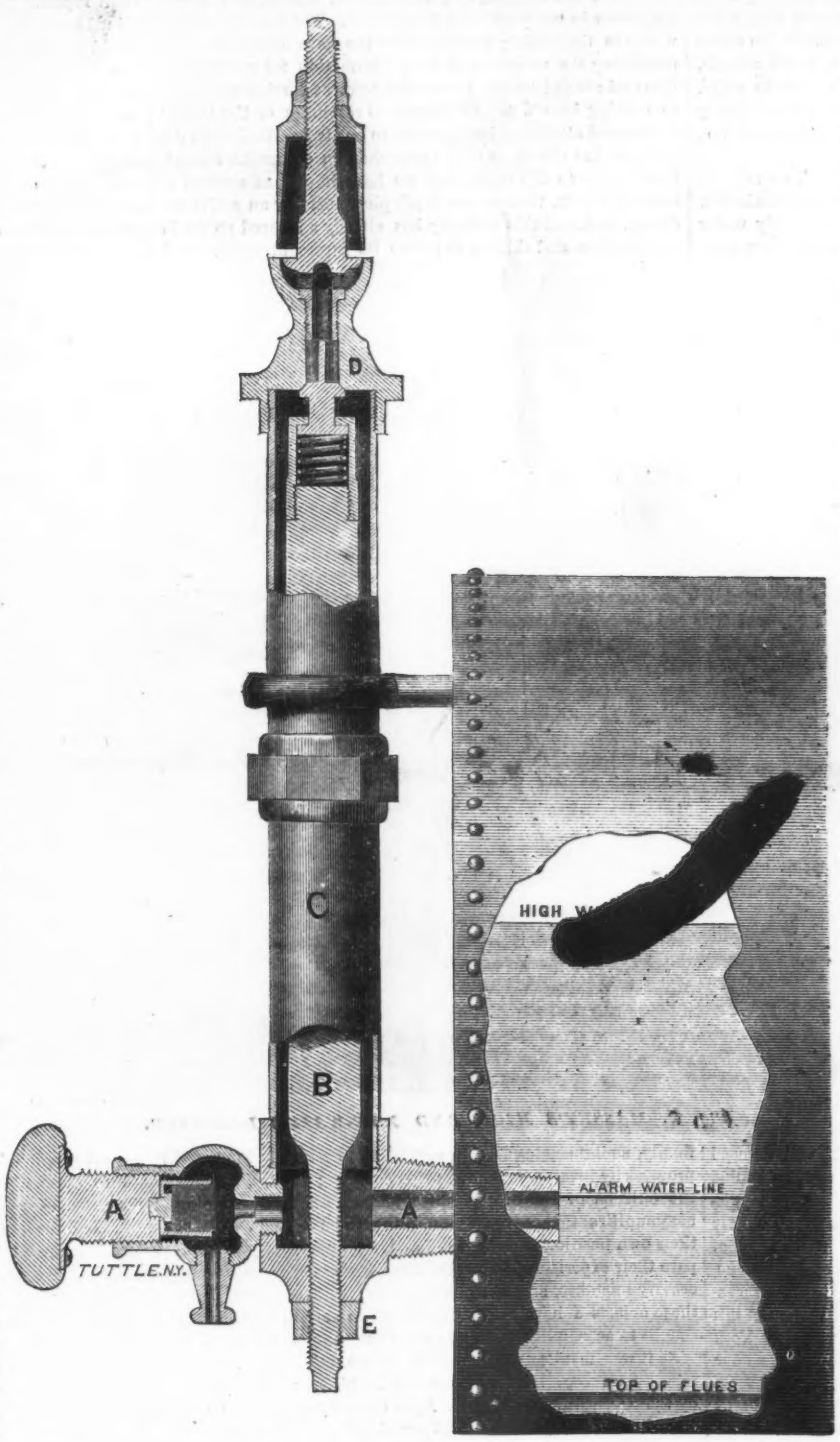

Fig. 1.—MASSEY'S EXPANSION LOW-WATER DETECTOR AND GAUGE-COCK COMBINED.

Automatic High and Low-Water Detectors.

The advantage, and in fact the necessity, of automatic detectors for boilers, has been already sufficiently set forth in our columns.

Fig. 1 of the accompanying illustration represents MASSEY'S patent expansion low-water detector and gauge-cock combined, which is recommended on account of its simplicity, and the ease with which it can be attached. This detector consists of the seamless brass tubing, C, one and a quarter inches in diameter and sixteen inches in length, with suitable brass fittings, A, A, with gauge-cock at the lower end, arranged to screw in the boiler in place of the lower gauge-cock; and a brass fitting, D, with steam whistle at the top. In the centre of the tube is a cast iron rod, B, galvanized to prevent rusting, the upper end holding the whistle valve, and the lower end passing down through the lower casting, which is threaded and arranged for adjusting with a wrench, as may be fully understood by reference to the engraving. The spiral spring shown in the upper end of the iron rod, is to admit of further contraction of the tube as it cools below 212°, the point of adjustment. The stay represented just above the centre of the indicator is only intended for locomotives on railroads.

The inventor states as follows the principle of the apparatus: "It is a well-known fact that all metals are more or less expanded when subjected to the influence of heat, and the expansion of brass is nearly double that of cast iron. It is equally well known that water at boiling point is only heated to 212°, Fahrenheit, while one hundred pounds of steam will mark 338° of heat.

"When the water in the boiler is at the high water line, or above the alarm water line, the communication with the detector is submerged, and, consequently, the pressure of steam will force water in the detector, the temperature of which cannot exceed 212°, Fahrenheit. At this temperature the detector is adjusted.

"When the water in the boiler descends to the alarm water line, the water in the detector will gradually descend, by its own gravity, into the boiler, and steam take its place in the detector; the increased heat of which will expand the tube nearly twice as much as the cast iron rod, raising the valve seat above the valve, allowing the steam to escape through the whistle, and sounding the alarm, which will continue until the water in the boiler rises to a safe height, when the tube will contract to its former adjustment, and the alarm cease. This indicator, being carefully adjusted at 212°, or boiling water, must be still further expanded when subjected to an increased degree of heat; and repeated tests have fully proven that twenty pounds of steam is amply sufficient to insure the prompt sounding of the alarm whistle."

The apparatus illustrated in Fig. 2 is a recent invention, covered by two United States, one English, and one French patent. It is made of cast-iron—galvanized—and also of brass, as may be ordered; but one instrument is equally as effective as the other, though brass being the more costly metal, and susceptible of higher finish, is, consequently, more expensive.

This detector consists of a steam-tight chamber, about five inches in diameter by eight or ten inches in height, with steam whistle at the top, and threaded at the lower end to screw in through a one-and-a-half inch hole on the top of the boiler; to the lower end of this chamber is attached a light one-inch brass pipe, extending down to the alarm water line, say one or two inches above the flues. Inside of this chamber is a metal float about four and a half inches in diameter, and seven to nine inches in length, with the whistle valve attached to the upper end. To the lower end of this float a light brass pipe, a half-inch in diameter, is attached, and extending down even with the outer pipe, to the alarm water line. Through this half-inch pipe a quarter-inch pipe is passed to the top of

the float and perforated so as to allow steam to pass out in the interior of the float; the lower end of this small pipe being curved up on a level with the high water line, as shown in the engraving.

When the water in the boiler is at the true water line, the pressure of steam will force water up in the chamber through the larger pipe until the float rises and closes the valve. The float having both steam and water connections with the boiler, when the water is below the high water line, must be filled with steam, which will equalize the pressure, and prevent collapsing. On the other hand, when the water in the boiler falls below the alarm water line, and below the end of the pipe communicating with the chamber, the water in the chamber will, by its own gravity, descend into the boiler, and its former space be occupied by steam, and that the float, now becoming a weight, falls to the bottom of the chamber, opening the valve and sounding the alarm. In case the water in the boiler rises above the high water line, both communications with the float being submerged, it will soon fill with water and fall to the bottom of the chamber, opening the valve, and allowing water to escape through the whistle, which must soon attract the attention of the engineer, and prevent damage. When steam goes down in the boiler, air will pass through the whistle, which at once becomes a perfect and certain vacuum valve. This indicator, being automatic, will adjust itself immediately after the water in the boiler falls below the high water line, or rises above the alarm water line.

The detector, illustrated in Fig. 2, is preferred, on account of the fact that it cannot be tampered with, while on the boiler, without certain detection, and will work as promptly under three pounds as under three hundred pounds of steam pressure. Two instruments are in operation at the Fifth Avenue Hotel. For further information, inquiries may be addressed to J. W. BLAKE & Co., general agents, No. 56 John street, New York.]

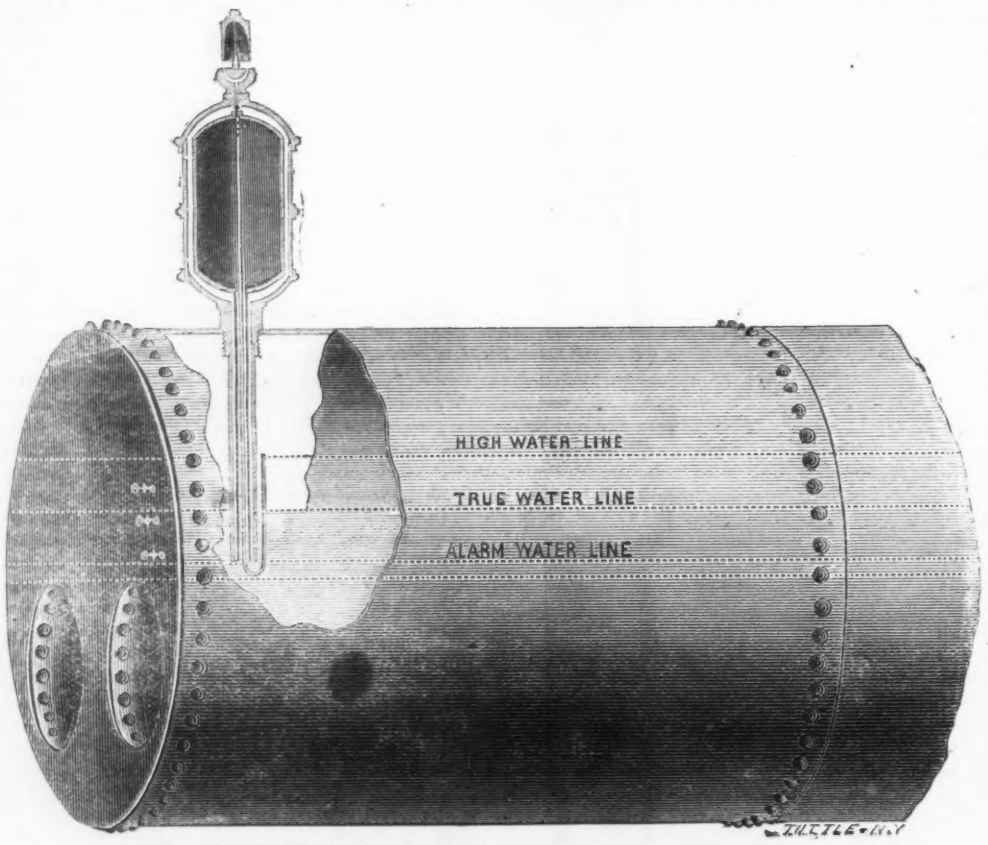

Fig. 2.—MASSEY'S HIGH AND LOW-WATER DETECTOR.

Progress of the East River Bridge.

THE East River bridge has advanced another step. A contract has been made for the building of the caissons or foundation structure of the suspension tower on the Brooklyn side. The cost will be $200,000, the timber to be furnished by the company. This ponderous piece of mechanism, weighing about 3,000 tons, will be constructed in the ship yard of Webb & Co., of Greenpoint, and floated thence to the water side of the tower, which will be the easterly slip of the Fulton Ferry Company, for the purchase of which the bridge company are now negotiating, and which the ferry company values at the moderate rate of $250,000. The caissons will be twenty feet in thickness and one hundred and seventy feet by one hundred and two, in order that the immense weight of the superstructure may be extended over such a surface that the pressure will not be more than four tons to the square foot, or about 69,360 tons upon 17,340 feet. The submarine excavation will be extended to two feet below high water level, and will proceed beneath the cover of the caissons, which will descend as the earth beneath is removed, and which will be hauled to the surface by means of a working shaft, and discharged into barges. This timber is supposed to be absolutely imperishable. At this deep immersion, it is beyond the reach of submarine insects, and its being exposed to one element alone, though that element be water, will rather conduce to its preservation than decay. We rejoice to find that the construction of this magnificent communication between the two cities of New York and Brooklyn is no longer a subject of doubt, and we now hope that the short interval of five years will find us relieved from those interruptions of daily communication which are characteristic of almost every recurring winter.—*Insurance Journal.*

Mrs. Partington Outdone.

HOW SCIENTIFIC EDITORS FREQUENTLY MAKE SAD WORK WHEN THEY COPY SCIENTIFIC ARTICLES.

Under the heading, "Is the Moon an Iceberg or a Furnace?" a well known journal of this city publishes a very interesting article, which has been widely copied, but we regret to say, sadly mutilated, as will be seen from the opening line, which we clip from an exchange:

"This is the question that stenographers are now earnestly discussing."

What on earth have short-hand writers to do with the moon, except to see that, when the almanac so directs, she gives light to guide them home after their nocturnal labors? A few months ago, a paragraph went the rounds of the press, gravely informing us that a certain captain had invented a new chromoscope for measuring the velocity of cannon balls! We never could see how an instrument for examining color could be used for measuring the speed of cannon balls. We presume the proof readers in these respective cases never heard of selenographers and chronoscopes.

A VALUABLE discovery of bismuth ore has been made near Balhannah, South Australia.

Preliminary Report of the Commissioner of Mining Statistics.

NEW YORK, November 19, 1869.

HON. GEO. S. BOUTWELL, *Secretary of the Treasury:*

DEAR SIR—Being unable, from the nature of the work entrusted to me, to render a complete report before the meeting of the Congress in December, I have the honor, in obedience to your request, to lay before you a brief summary of my operations during the past season, together with a general statement of the results accomplished, and the various topics to be fully treated in the formal report which I shall present at the earliest practicable day.

The instructions from the Department under which I have been acting, contemplate something more than a mere collection of the figures, representing the annual product of the gold and silver mines of the Pacific States and Territories. They refer to me for examination, among other things, particularly the subjects of the condition and needs of the mining industry in those regions, the relations and duties of the government towards it, and the important question of the merits and deficiencies of the methods and apparatus of mining and metallurgy now in use within my department. The bearings of this work are three-fold; first, towards the government itself, as furnishing the necessary basis of information for wise legislation and administration; secondly, towards foreign countries, as making known the great natural resources of the United States, and attracting immigration to our trans-Mississippi domain, and at the same time strengthening our credit abroad, by showing to the world that we have important sources of mineral wealth, that we are developing them by an active industry, and that this industry has already advanced so far in organization and skill as to insure its future prosperity, and finally, as influencing foreign capitalists to assist our national progress by investing money in this country; thirdly, towards the citizens of the United States, and especially the mining communities themselves, as affording them a knowledge of their own position and progress, and an opportunity to compare their experiences one with another, thus avoiding unnecessary mistakes, and consolidating the results of practice. All these objects I have constantly borne in mind; and I have sought to accomplish them all in the execution of my work.

As it was manifestly impossible for me to consider, in my report for 1868, all the topics which had been referred to me by the Department so late as April of that year, I chose that one which appeared of the most pressing importance, namely, the relations of the government to the mining industry on the public lands. My report was divided into two parts—the first containing observations and statistics concerning the actual condition and prospects of the mines, and the second being devoted to a thorough discussion of the questions of mining law and mining education. The value of the first part was largely temporary, since the condition of the mines, and even the location of the principal centres of activity, is constantly changing. Whatever there was of a permanent character, such as descriptions of topographical or geological features, etc., in the reports of Mr. J. Ross BROWNE, my predecessor, I took care not to repeat; and the first part of my report of 1868 must be considered as part of a series, to which the reports of 1866, 1867, and 1869 also belong, it being necessary to take them all together, if a complete account of the mineral resources of those States and Territories is to be obtained. Nor is that picture to be considered as complete, even in the four reports named. There is still ample room for additional descriptions. Few men comprehend the vast extent of our metalliferous territory, and the utmost activity on the part of the United States Commissioners has not enabled them, as yet, to compass in four years one single circuit of the whole field.

Following the arrangement of my last report, I shall this year divide the results of my labor into two parts—the first to be occupied with descriptions of mining districts, new mining enterprises, etc., statistics of production, and general observations on the condition and prospects of the industry in the different districts. The collection of this information has been my principal labor during the past six months, and I feel confident that the amount and value of material secured will be considered highly satisfactory, in view of the time and means at my disposal.

Leaving New York at the close of May, as soon as my preparations could be completed, I visited in rapid succession the principal mining and commercial centres of Colorado, Utah, Nevada, California, Oregon and Idaho, accomplishing in all a journey of some 10,000 miles. The fatigue consequent upon so much prolonged and unceasing travel caused me, early in the autumn, to forego an intended trip through Montana, and return instead to New York, for needed rest. It is scarcely necessary for me to say, that my object in these personal visits was not to accumulate by my own observations the material for a report. Little more than general impressions can be gained in such journeys; and the most experienced engineer would need a longer acquaintance with local circumstances before pronouncing even a general opinion on grounds of independent conviction. It would have cost me the whole summer to examine a single district as carefully as such a course would require. On the other hand, I have avoided as much as possible the employment of travelling agents, partly on account of the expense of such a course, and partly because, by a smaller outlay, more reliable data can be obtained from competent resident agents. My object, therefore, in visiting as many of the mining districts as possible, has been to seek out suitable persons for this work, and at the same time to gather by observation and extensive conversation with citizens such general views as would enable me to correct in the reports of my assistants those errors of narrowness and one-sidedness into which local observers are too liable to fall.

In executing this plan, I have met with the greatest courtesy, and frequently received most valuable assistance, freely contributed. The various railway, steamboat, stage, and express companies west of the Missouri have afforded me every facility of transportation, in most cases without charge; and a hospitality has been extended to me by the citizens, so cordial as to resemble the welcome of personal friendship, rather than the formal reception of an official functionary. More detailed acknowledgment of the assistance rendered me in these and other ways I shall take pleasure in making hereafter. There has been, in some quarters, a misconception, quite natural under the circumstances, concerning the nature of my mission. Those localities which I have not been able to visit have been represented as neglected, and it has appeared to some persons my duty to go especially into undeveloped districts, to inspect especially mines that were for sale, and to make such reports therenpon as would "attract capital." This mistaken notion I have endeavored to correct by explaining, both through the press, and by means of public addresses, the true objects of my work, and the policy of the government towards the mining interest. Of course I do not feel called upon to "puff" or to condemn individual schemes, though I have not hesitated to praise well-managed mines, and to expose wholesale frauds. As to the localities personally visited, and the time devoted to each, I have claimed and exercised full discretionary power, with reference to the best final results; and by those results, as embodied in my full report, I have declared myself willing to be judged.

Colorado, Wyoming, Montana and New Mexico do not lie wholly west of the Rocky Mountains; but they are included in the spirit of my instructions; and I have attempted therefore to procure information concerning them as well as the regions absolutely within my department.

The first part of my report for 1869 will therefore contain the following matters:

1. *On California.*—A general view of the mining industry of the year ending July 1, 1869, together with estimates of production for that year and for the remainder of the calendar year, 1869. From many of the most important mining counties I have been able to obtain statistics of great value, by means of blanks which I prepared and circulated through my agent for California, Mr. W. A. SKIDMORE, of San Francisco. In that State, mainly by reason of the vigorous exertions and wide acquaintance of Mr. SKIDMORE, the use of these blanks was partially successful; though even in California the statistics thus obtained are far from being complete; and in other States and Territories my attempts to obtain information by this means have, for the most part, utterly failed. I call attention to this fact, as indicating the impossibility of collecting the statistics of mining for the next census by means of blanks alone. The reason lies partly in the scattered condition of the mining districts, and the difficulty of reaching all enter-

prises in progress, partly in the disinclination of the miners themselves to furnish any information about their operations (since it may equally hinder their business plans to confess losses on one hand, or acknowledge gains on the other), partly in the difficulty of analyzing for tabulation the results of labor of which no proper records are kept, and partly in the natural, often unconscious, exaggerations into which both sanguine temperament and the purpose of speculation betray the owners of mines. I am satisfied that blanks should be employed as auxiliaries merely, and that the mixed system I have partially perfected will prove, for some time to come, the only practicable and useful one. The product of California for the year I cannot yet give with accuracy; but it will certainly fall below that of last year, on account of the extraordinary drought, which put an end to the placer and hydraulic mining of the northern counties very early in the season. Another temporary cause of decreased production was the stoppage of several important mines in the foremost quartz-mining district of the State—Grass Valley, on account of a miner's strike, the causes and merits of which are discussed in the report.

2. *On Nevada:* A full account of the present condition and prospects of the Comstock mines, in continuation of the elaborate description contained in the report of 1868. Much has been written concerning the geological features of this great lode, and many valuable contributions to the science and history of mining have resulted from its development; but I think it is now for the first time treated as a whole from a practical stand-point, and with reference to the exact position, extent, and character of all the bodies of valuable mineral which have ever been discovered between its walls. The yield of the Comstock mine has been largely reduced this year by the exhaustion of various old workings, upon which some of the companies have been relying; but especially by the disastrous fire in the Crown Point, Kentuck, and Yellow Jacket, which has interfered with the production of those important mines. The prospects of this district for the future, however, are considerably brighter than they were a year ago; and the Virginia and Truckee Railroad, which is rapidly approaching completion, and the Sutro Tunnel, work upon which is reported to have begun, promise great benefits to the Washoe mining industry.

The report will also contain an extended account of White Pine and surrounding districts. The rapid progress of development in this region, and the large amount of bullion which it has already produced, render it more worthy of especial attention at the present time than at any other within my department; and I have accordingly devoted to it a considerable space. The operations of the year in Humboldt, Lander, and Nye counties, and other parts of the State, will also receive due description. The gold mines of Red Mountain, near Silver Peak, are especially worthy of notice, as opened with a large but wise outlay of capital, so expended as to secure an extremely low rate of subsequent running cost. This year's product of bullion from Nevada will probably not fall far behind that of 1868, the deficiency from Washoe being made up by the greater yield of White Pine. A number of extensive enterprises have failed in Nevada since my last report, with considerable loss to capitalists; yet, on the whole, the prospects of the State have improved, especially in view of the late discoveries in depth on the Comstock lode (tending incidentally to increase the security of all operations on true fissures), the completion of the Pacific Railroad, and the gradual introduction of cheaper labor, particularly of Chinese labor, into the mines. The bearings of all these points will be fully discussed.

3. *On Oregon:* A general description of the mining districts of this State, the great mineral wealth of which, reinforced as it is by unequalled agricultural resources, has hardly yet received the consideration it deserves. The product of gold during the past season has been, it is true, unusually small; since very little quartz mining is carried on in the State, and the placer and hydraulic mines have stood still nearly all summer, for the lack of water. The descriptions in the report will serve to convey some idea of the possible future extent of the mining industry in Oregon.

4. *On Washington Territory:* Some interesting observations and descriptions, not amounting, however, to a complete account of the whole region, the thorough examination of which is at present impossible, except through an organized and prolonged survey.

5. *On Idaho:* A general description of the existing districts, together with some account of the new discoveries of the past year. The same causes which have affected the placer mines of Oregon, will render this year's product of gold from Idaho comparatively small; but the results of quartz mining in the Owyhee and other districts will probably not fall short of last year.

6. *On Montana:* Full notes of the operations of the year, with estimates of bullion product, etc. The drought has extended into this Territory also; and I anticipate a decrease in the yield from the hitherto so productive gulches. Quartz mining in Montana is still in its infancy; but there is no reason for discouragement as to its future. The vigorous campaign of General CROOKE against the renegade Snakes and other hostile tribes, have produced a peace which is likely to be permanent; and a considerable extent of country is now open to prospectors in Idaho, and along the borders of Montana, in which valuable discoveries will probably be made.

7. *On Utah:* A brief account of the present mining enterprises, and their prospects.

8. *On Wyoming:* A full description of the Sweetwater mining region, with statistics of yield, etc. Also, some account of the coal-mining on the line of the Union Pacific railroad.

9. *On Colorado:* A description of the gold and silver districts around Central City and Georgetown, and notices of outlying districts, with a discussion of the prospects of the Territory. Colorado appears to me to have passed a turning-point in her history during the present year, and to be destined to advance henceforth, with great rapidity, towards wealth and power. The yield of the mines for 1869 is highly encouraging; especially in view of the fact that it is the product of steady industry, and not the first fruits of a speculative activity, which might be expected to die out again at an early day. These points will be discussed at some length.

10. *On New Mexico:* I hope to present the most complete description of the mining districts and resources of this Territory that has ever been published. A competent and zealous assistant has been occupied for some months in personal observations, inquiries, consultation of Spanish archives, etc., and if his life and health are spared, in the discharge of his arduous duties, I shall soon receive from him material of great value. I hope the result of his labor will convince the government of the expediency of providing for still more thorough surveys, in this richly endowed, historically and archæologically most interesting, but thus far neglected and almost unknown Territory.

11. *On Arizona:* A meagre report, confined principally to the operations at Wickenburg. My two agents, employed in this Territory, both fell victims to the fever, which, though it fortunately spared their lives, effectually interrupted their labors; and I received this unwelcome information too late to make other arrangements.

12. *General Observations.*—Under this head I shall discuss the present position of the mining industry as a whole, the difficulties under which it still labors, and the solutions which are being wrought out by time and experience. The labor question and the operation of the present mining law are the most important topics of this class; and will receive due attention. I have seen no reason to alter the views expressed at length on the latter subject in my first report, or to relax the earnestness with which I then pressed upon your attention the necessity of a National School of Mines.

The second part of the report will be occupied with the description and discussion of the methods of mining and metallurgy employed in the Pacific States and Territories. The importance of this subject cannot be over-rated. There are many who fancy that we lag far behind European nations in technical skill; and even professionally educated men (personally unacquainted with the West) have proposed the sending of a Government Commissioner to study gold and silver mining and metallurgy abroad, and report his discoveries for the benefit of this country. On the other hand, an equally numerous class imagine that foreign nations can teach us nothing at all; and that the local experience already gained in this country is worth more than the combined science and practice of the world. Both, and neither, of these opinions are correct. Certainly, in my opinion, the great necessity is to study, systematize and consolidate the results of our home experience, rather than attempt the importation into a strange soil of a full-grown exotic science, or even the grafting of that plant upon a stalk not yet itself fairly grown. I have proposed to myself as the central theme around which this part of my report will be gathered, the inquiry: "What is our position, relative to that of other nations, and to our necessities, in the arts of mining and metallurgy?" From this stand-point, the report will be at once more and less than a text-book of those arts. It will serve to assure the world that we are measurably triumphant already over the difficulties of our mining and metallurgical industry, and fully competent to receive and digest the assistance of foreign science; while it will at the same time furnish our citizens with a much needed means of comparing their own experiences; and constitute the first step towards the attainment of the great desideratum—a distinctive American Science of Mining and Metallurgy, based upon American, as well as foreign, experience, adapted to the physical and economical conditions of American enterprises, and continually perfected by the harmonious efforts of American experts. Thus, and thus only, can we really utilize the fruits of European research and training, or lift these arts in our own country out of the control of visionary inventors, pretentious impostors, well-meaning but incompetent managers, and speculative capitalists, alternately exalted with preposterous hope, or prostrate in preposterous despair, and too often tempted to seek upon the stock-exchange the profits which they have failed to find in the actual work of mining. I believe the establishment of a National School of Mines is necessary to the full achievement of this desirable result; but meanwhile, everything which assists the consolidation of American experience and the formation of a class of intelligent and impartial investigators, contributing their discoveries to the common stock of information, is a step in the right direction; and I am willing to hope that my forthcoming report may exert such an influence.

The abstract of contents thus given is sufficient to show you the magnitude of the work before me. I could not expect to finish it for many months, but for the co-operation of many men of science and experience, each of whom is high authority on the subject assigned to him. I repeat, that I shall take pleasure hereafter in making detailed acknowledgment of the generous assistance of all my co-laborers; and, reinforced by their industry, I hope to lay before you, during the next session of Congress, a report of which I may freely say, since so much of it will be the work of other and abler hands, that I think it will prove one of the most instructive and interesting ever submitted to the government in connection with this important branch of the national wealth.

Hoping that this condensed account of my labors and plans will satisfy your immediate requirements, and regretting that both the mass and the present incompleteness of the data in my hands render a more accurate and detailed statement, at this early day, impossible, I have the honor to be, very respectfully, your obedient servant,

R. W. RAYMOND,
U. S. Commissioner of Mining Statistics.

Notes from Southwestern Virginia.

BY A. EILERS, MINING ENGINEER.

III.—THE COPPER MINES.

IN the broad belt of metamorphous rocks, between the Blue Ridge on the east and the Iron Mountains on the west, occur three copper bearing zones, called respectively the "northern lead," the "native lead," and the "southern lead." All three are traceable for long distances, but the most continuous and vein-like is the first named. The native lead has been opened in only two places, at SUTPHAN'S, and near Big Reed Island creek, in Carroll county, both of which are deserted at present. The southern lead had been extensively worked before the war, at the Toncrey mines, in Floyd county; at the Alleghany mines, in Alleghany county, N. C.; and at intermediate points. The Toucey and Alleghany mines are valuable mineral deposits, but neither of them has been taken up again since the war, principally on account of the scarcity of capital in the Southern States. The northern lead, by far the most important of all, is worthy of a more detailed description, not alone on account of its extraordinary longitudinal extent and the great regularity and thickness of the veins, but also on account of the remarkable geological formation.

The northern or "iron lead," is situated on a broad band of talcose slates, about three miles southest of the Poplar Camp or Iron Mountains, and running nearly parallel with that range. It extends through the counties of Carroll and Grayson, in a southwest and northeast direction, and has been traced and extensively worked for fifteen miles. Numerous mines, from the Ore Knob and Great Outburst, in the southwest, to the Sutphan mine at the northeastern terminus of the lead, nearly all lying idle at present, bear testimony of a once flourishing industry. The Hale Mines, and the Bettie Baker property, adjoining each other, near the northeast end of the lead, have been thoroughly prospected and worked on an experimental scale during the past two years; and the character of the deposit can be studied better at these points, than anywhere else in the neighborhood. A description of the same, with the results of work performed in the mines and smelting works of the Hale Copper Mining Company, may therefore give important facts and valuable data for future operations on that lead.

The Hale Copper Mining Company's property, owned by the company in fee simple, embraces over two thousand acres of heavily-timbered land. The main vein runs through the property for a length of three miles; a smaller side vein is about one and a half miles long. On the Bettie Baker property, a lease of which the Hale Copper Mining Company has lately received, the length of the vein is a little over a mile. On the southwestern end of the Hale Copper Mining Company's property, the width of the deposit is not very great, and the tunnels, driven into the hill sides on the course of the lead, have revealed a great many bands of slate (horses) in the vein mass. For the length of about one thousand feet, even, no trace of the vein can be found on the surface of the ground; and crosscuts, pits, and the exposed bottom of the small creeks, show only a broad mass of talcose slate, thickly impregnated with magnetic pyrites. But about a mile from the southwestern end of the property, on the top of one of the many ridges cut by the lode, huge masses of gossan, an impure, porous, hydrated oxide of iron, make their appearance. From this point on, the vein can be traced by large boulders and lumps of gossan, lying on the surface of the ground, and especially on the top of the flat ridges, throughout the remaining part of the property and the Bettie Baker. Eleven adits have been driven into the vein, all along its course, on the Hale property, and six on the Bettie Baker. Many shafts have been sunk to a depth of from twenty to sixty-five feet for the extraction of the decomposed ores and for ventilation; and in all of them the same remarkable arrangement of a regular super-position of different minerals has been found. One incline on the Hale property has been sunk deeper, and is intended for an exploring shaft of the vein in depth, and also as a preparatory step for the extraction of the undecomposed ores, as soon as the supply of decomposed ores becomes insufficient for the capacity of the smelting works. The vein is found to dip in its upper, or soft part, from 28 to 33 degrees to the southeast. Below the water level, at a depth of 103 feet on the incline, or 57 feet vertically, it assumes a dip of 42 degrees. The depth of the gossan, or iron cap, is found, according to whether it is penetrated in the valley, on the slope, or on the top of a hill, to be from 10 to 60 feet; on an average, it may be said to be 30 feet deep. It is cut off sharply at the bottom, and followed by a layer in the vein, consisting of a mass of black soft ore, which is found to contain half-decomposed magnetic pyrites, common iron pyrites, black and red oxide, carbonate, sulphate, and grey sulphuret of copper. This zone or layer is from six inches to six feet on an average, probably, eighteen inches to two feet, in depth. The richest copper ores, such as black and red oxide and grey sulphuret, occur invariably on the top as a thin crust, while the thicker layer below consists of poorer ores, having a heavier admixture of sulphuret of iron. This layer is again as suddenly and sharply cut off below as it was above; and solid, hard magnetic pyrites, with but little yellow sulphuret of copper, occupies the vein. At greater depth, more and more copper pyrites is found to be interspersed in the iron pyrites, so that, at the depth of 175 feet, (the present bottom of the deep shaft), solid ores, which show 3½ per cent. of copper by assay, are met with. The width of the vein on the northeast half of the Hale property, and on the Bettie Baker, is frequently as much as from forty to sixty feet, and never, with the exception of a single case, falls below eight feet. It is worthy of notice, that the peculiar position of the black ores, following the water line parallel to the surface of the hills, and the fortunate fact that the vein runs across the ridges, greatly facilitate extraction, enabling the company to practice mining mainly by tunnels, and to save large amounts,

which would otherwise have to be expended for the hoisting of the mine waters.

The black ore beds are undoubtedly the accumulations of the decomposed yellow sulphuret of copper, which was once interspersed in the superincumbent mass of the then magnetic pyrites. Carried downwards in soluble form by the surface waters, they were again precipitated, altered and reformed, by organic and atmospheric agencies, and remained in that state at a level, beyond which the surface water could not enter the vein. These ores are easily stripped of the gossan lying nearest to them, and readily dug out by the use of the pick and gad alone. The richness of the upper crust is very great, and ores containing from twenty-five to thirty-six per cent. of copper are frequently met with; but the mass of poorer quality lying under the crust, cuts down the average contents of ore thus far raised to six per cent. Still larger masses, averaging from three and a half to four per cent., could not be worked to a profit hitherto, because on the small capital invested by the company for experimenting and prospecting purposes only, apparatus for beneficiation in the hurried way could not be erected. By that method immense masses of low grade ores, both on the Hale property and on the Bettie Baker, can be profitably wrought. Careful estimates of cost of apparatus to be erected, as well as expense of production of articles to be manufactured from the ores, show a large yearly profit.

In the following, an account of the work performed by the company thus far, and of the intended enlargement of the works next spring, will be given, together with such estimates as an experience of actual working of over two years will render reliable and conclusive.

The Hale property and the Bettie Baker were first prospected in 1856. Considerable work was afterwards done, and many thousand tons of ore raised at the Bettie Baker. The ore was shipped to Baltimore until the commencement of the war, when, with the exception of a little mining done on account of the Confederate Government, no more work was performed. On the Hale property, only two tunnels were run a short distance into the hill and two shafts sunk, when litigation between Mr. HALE and the Lead Mining Company of Wythe County put a stop to all further developments.

An adjustment of conflicting claims having been arrived at, some three years ago, the Hale Copper Mining Company bought the property of Mr. F. L. HALE, of Hillsville, and commenced exploring the mines and opening drifts and shafts in June, 1866. Well aware that the ores would not bear shipping, the mines being twenty miles from the nearest railroad station, the company commenced, as soon as the developments in the mines warranted the outlay, to construct small smelting works on the spot.

Eleven tunnels have since been driven into the vein, from the valleys of the small brooks intersecting it. The old shafts have been cleared out and two new ones sunk, one for ventilating purposes, the other for exploration of the vein below the black ore stratum. The decomposed ores were invariably found at from ten to sixty feet below the surface, and ores carrying on an average six per cent. of copper, were extracted and delivered at the roast-sheds, while great masses of ore below that grade were left in the mines for future exploration. The richest and most abundant ores were found in tunnels Nos. 2, 3, 5, 7, 10 and 11. No. 4 rises steeply with the surface of the hill into which it is driven, and contained great masses of poor ore. Most of them had to be left in place, as they could not be beneficiated with profit at the time. In No. 6, the vein was found to enclose thick masses of slate of great longitudinal extent, and although the ore was of good quality, the small size of the ore-streaks, which could not be worked without blasting a great deal of slate, prevented profitable extraction. In No. 8, the vein pinched out to a mere seam, and in No. 9, although it became of large size again, work was not pushed forward, because ore could be got cheaper and of better quality in the other tunnels. These adits open parts of the vein for a length of about one and one-quarter miles from the northeastern end of the property. No two of them, however, driven from opposite sides into the same hill, have met, as yet, and a great deal of black ore remains untouched on the top of the ridges. Shafts, and two tunnels driven far enough into the hills to reach the deposits under the summits, have established the fact, that on top of the ridges the vein is invariably either a great deal wider, or else harder and carrying better ores, than in the valleys, where it is often as narrow as eight feet, and split up by masses of slate, while on the ridges it is often as wide as thirty-five and forty feet. These slates are, however, very often finely impregnated with sufficient quantities of copper ores to make the profitable extraction of the metal in the hurried way possible. The extreme northwest portion of the main vein, near Little Reed Island, carries very good black copper ores, as does also another smaller vein of four feet, about one mile northwest of the principal one; but neither of these localities has been worked as yet, since ores nearer to the furnaces could be got with less outlay. The Bettie Baker, a lease of which the company has lately secured, contains the largest mineral deposit in the neighborhood. The vein is nowhere less than fifteen feet wide, and two-thirds of its length are certainly on an average thirty-feet thick. In one locality the outcrop on the surface indicates a width of over two hundred feet. Although enormous masses of very rich black ores have been extracted and shipped from this property, the mines are far from being exhausted. The tunnels are usually run into the deposit without any special plan or system, some on the foot-wall, some on the hanging-wall, and most of them right into the middle of the vein, and following evidently the rich ore-streaks found at the entrance. Apparently no attention has been paid to ore deposits to the right and left of the tunnels, or to those spurs which frequently incline downwards in these veins. The very few crosscuts serve only to show the extraordinary width of the deposit, while the ore between them, though exposed all through the tunnels under the gossan, was left untouched. The principal reason of this was undoubtedly, that at the time mining was formerly carried on here, ores containing less than ten per cent. of copper could not be profitably shipped. By smelting the ores on the spot, however, and especially by manufacturing from the product of the smelting furnace still other merchantable articles, even ores which contain only five per cent. of copper, can be mined and smelted with profit, while by precipitation, ores of even three per cent. can be made to swell the gains of the enterprise.

There is no mining region in the United States where labor and fuel can be had as cheap as in these Virginia mountains. This circumstance, with the additional advantage of very low rates of transportation to the commercial centres of the North, makes the treatment of these low-grade ores a safe and remunerative business. About one-fourth of the length of the vein on the Bettie Baker is not touched at all, and as this portion of it happens to be over one hundred feet wide, a very large amount of decomposed black ores is undoubtedly awaiting extraction in that locality alone.

The southwestern boundary line of the Bettie Baker, where it joins the Hale property, is only half a mile from the smelting furnaces on the latter estate; and the cost of transportation of the ores to the roast-sheds will therefore be small.

The present beneficiating works of the Hale Copper Mining Company are built on the German plan, with a view of saving fuel, which in the long run of time will undoubtedly become scarce, even in the mountains of Virginia along the Blue Ridge. Whenever the day arrives when all these splendid forests are no longer in existence, fuel for copper-smelting will have to be brought up the mountain from the coal fields northwest of New River, a distance of eighteen miles; and to defer that day as long as possible, it was resolved by the company to build blast-furnaces.

The smelting works consist of five roast-sheds, twenty-five feet by fifty feet, for open heap-roasting; two stadels under cover, eight by six feet, for the roasting of concentrated mattes; a coal-house, capable of receiving ten thousand bushels of charcoal, and a very substantial building, sixty by fifty feet, which encloses the two blast furnaces, and a small engine and blast-house, with mill for stubbe. The blast is furnished by a MCKENZIE pressure blower, driven with a ten horse-power portable steam engine, built by the Washington Iron Works of Newburgh, New York. The furnaces are built side by side, and have separate chimneys, which, in order to diminish the draft above as much as possible, and to avoid the loss of fine ore, are made very wide, and rise over twenty feet above the tunnel-head of the furnaces. The height of the furnaces proper is, on account of the easy reduction of the ores, and especially to avoid the formation of salamanders, only nine feet from the tuyères to the tunnel-head. The inside shape of the furnaces is rectangular, twenty-eight inches wide and forty-one inches deep, after the breast is inserted. Two tuyères lie side by side in the backwall, and converge so that the two blasts meet six inches behind the breast-rock. They are also inclined forward at an angle of three degrees, so as to hit the molten masses in the crucible in the same spot, where the two rays meet. The pipes have an opening of one and one-half inches each. The crucible consists of a mixture of finely ground charcoal and fireclay, commonly called stubbe, which is two and one-half feet thick, and firmly beaten in, while moist, with tamping irons of one inch face. The crucible proper is afterwards cut out of this mass in the shape of a basin, wide and flat near the tuyères, contracting and deepening in the middle of the furnace, and finally running as a narrow and deep channel to three inches outside of the breast-rock. Immediately under this rock the channel is four inches wide and seven inches deep at the commencement of the campaign, and the point of the upper tapping block touches the bottom of the crucible on one side at that depth. A second tapping block is inserted from the other side of the fore-hearth, the point of which lies thirteen inches below the lower edge of the breast-rock. The second tapping channel thus constructed serves in the latter part of the campaigns, when the crucible has become deeper. The fore-hearth is three feet long, and so inclined that the top of the fore-plate lies thirteen inches under the lower edge of the tamp-rock, and fifteen inches under the tugères. During the campaign the slag runs continually from under the breast-rock over the fore-hearth and lip into the slag-basin, which lies eighteen inches below the top of the fore-plate in the floor of the building. It is made of coarse stubbe, the siftings from that which has been used inside the furnace. The stabbe used during ore campaigns is what is technically termed "light stubbe," being composed of three parts of coal-dust and two of white clay. During black copper campaigns the crucible and basin are built up of "heavy stubbe," one part of coal-dust and two of white clay.

The white clay is found near the furnaces in several localities. Fire-bricks have been made out of it, which are used for rebuilding and repairing the furnaces, together with an excellent quality of tale-slate, which is quarried opposite the furnace site. The latter is principally used in huge blocks for the inside walls of the furnaces, which are twenty-eight inches thick, of solid fire-proof material. The mantle or outer wall is three feet thick and built of brick. Canals run in a horizontal and vertical direction through the mantle and the inner walls, to permit the moisture to escape and prevent cracking and bursting of the masonry. Iron ties, at the height of the crucible and above, give the whole an additional support.

A small German blast refining furnace completes the list of the works erected at present. It stands on the west side of the building, under a stack thirty-six feet high, and is eight feet wide by five feet deep. The crucible is two feet in diameter, tamped firmly out of a mass of two parts of white clay, one of white sand and one of coal, and smoothed over inside with a thin layer of white clay. Two parallel layers, with an inclination of ten degrees, lie in the back wall. The furnace is used for refining the black copper produced in the other furnaces, and also for smelting over such large salamanders as cannot be broken into pieces sufficiently small to go through the high blast-furnaces. In the latter operation, the metal is taken out by tapping, instead of ladling, as is done with fine copper. For that purpose, an aperture is left in the fore-plate for the introduction of a tapping-block whenever occasion requires it.

The floor of the furnace-house, before the furnaces, is substantially laid in slabs of tale-slate. The furnace-building itself is built with its back part into the hill, so that the charge-floor is on a level with the coal-house bridge. Above the furnace-building and the coal-house, which stands on a level with the charge-floor, the roast-sheds are built in two rows along the summit of the hill, thus securing a descent for the ores to be brought from the sheds to the furnaces. The blacksmith-shop and the engine-house are located about fifteen feet below and a little to the left of the furnace-floor. The wind is conveyed by a main pipe, nine inches in diameter and one hundred and twenty-five feet long, behind the furnaces, where it is distributed into the three wind-stocks.

Besides the smelting establishment, the company have erected a store, a large frame house for the Superintendent, a boarding-house, a large shaft-house, and covered, when over the deep shaft, twelve small houses for workmen, and the necessary stables and ore-sheds at the mouths of tunnels.

The number of workmen employed during the opening of the mines and while the works were building has been from fifty to sixty, besides the necessary wood-choppers in the winter. The working of the establishment, after the buildings were completed, required fourteen men in the furnace, who received from 75 cents to $1.25 per day, and about twenty-five to thirty miners, one-half of whom received $20 per month, the other half $26. One overseer at the mines and one at the smelting works received respectively $32.50 and $40 per month, and a mason $500 per annum. Besides the repairing of the furnaces, this man had also to cut the fire-proof rock in the quarry.

MINING SUMMARY.

Nevada.

THE COMSTOCK.—COMPLETION OF THE RAILROAD.

The Gold Hill *News*, Nov. 19, thus chronicles the first shipment of Comstock ore by the new railroad: "The first lot of ore from the Yellow Jacket mine—and in fact from the Comstock ledge—yet shipped over the railroad was sent down yesterday to the Yellow Jacket mill on Carson river. There were seven car loads of it, about eight and a half tons to the load, or not far from sixty tons. This was from the 700 foot level of the old north mine, and dumped directly into the cars, the railroad passing within a few feet of the shaft. It is low grade ore, assaying $26 or $28 to the ton, and wil yield under the stamps not far from $17 per ton. It is ore which heretofore was considered too poor to work, and was accordingly used to fill up drifts with. The railroad now affords for the first time a chance to work this low grade ore profitably."

THE STETEFELDT FURNACE.—WORKING RESULTS.

The Austin *Reveille* publishes the following extracts from a letter of a correspondent at Reno, in relation to the operations of the Stetefeldt chloridizing furnace: "The furnace does truly astonishing work. The bullion is over 900 fine, while the reverberatory furnaces would certainly not give bullion over 600 fine from similar ore. The tailings assay but $4 to $6; while in Austin they would assay from $9 to $20 per ton. With the same amount of wood now used (from 2 to 2¼ cords of slabs a day) I think twenty tons of ore could be sifted into the shaft and come out well roasted. Of course we have not yet been able to get accurate working results; still the above ought to satisfy the most skeptical. It is really astonishing to go into this mill and see the masses of pulp continually pouring from the furnace. I have made out the following estimate of the cost of roasting sixteen tons of ore in the Stetefeldt furnace, say at the Manhattan mill in Austin:

Two feeders, or machine men	$ 8 00
Two firemen, etc	7 00
Three cords wood	27 00
Six per cent. of salt, 1,920 lb., @ 2 cents	38 40
Sieves, etc	4 00
One cooler and carman	4 00
Total	$88 40

"Which is at the rate of $5 50 per ton. I have estimated the capacity of this furnace sixteen tons daily, though I am of the definite opinion that it will reach twenty tons."

BULLION FROM PAHRANAGAT.

Twenty-five thousand dollars, represented in twenty-two silver bars of bullion, are now on the way to this city from the district of Pahranagat. The Austin *Reveille*, Oct. 19, has the following account of it and of the operations of the Illinois company which produced it: "Yesterday Mr. James Wilson, the General Agent of the Hiko Company, and Mr. J. M. Dawley, the Superintendent of its reduction works, arrived in this city with twenty-two bars of silver bullion, valued at about $25,000. It will be shipped overland to New York immediately. We were informed by Mr. Dawley that the bullion is the product of about thirty days' run of the ten stamp mill of the company. The ore from which the bullion was obtained was produced by the Illinois—a large true fissure vein—the principal mine of the Hiko company. Our informant stated that the ore reduced at the mill ranged in value from $80 to $100 to the ton. The Illinois is said to be of large dimensions, with the ore interspersed through the gangue from wall to wall; and we have the authority of Mr. Dawley for the statement that assays of the entire width gave the fine average of $40 per ton. The mill of the company is situated at Hiko, while the miners are at Silver canyon, some ten miles distant—a relation which is inconvenient and expensive. It is the object of the present management to change this if possible. For this purpose an artesian well has been commenced in Silver canyon, near the mines. The well has been bored already 150 feet; and it has been estimated that a full supply of water will be obtained at a depth of 300 or 400 feet. If these estimates prove to be well founded, the company will erect at once a twenty stamp mill on the ground, where there is plenty of wood. In the event of the company removing and enlarging its reduction works, it is to be hoped the manager will not overlook the economy claimed for the new chlorodizing furnace

invented by C. A. Stetefeldt. For if the Illinois mine is, as it is represented to be, of large dimensions, and carrying ore from wall to wall that will average $40 per ton, the Stetefeldt furnace is the only known means by which the whole mass of the ore can be utilized. So long as ore is chlorodized in the reverberatory furnace its value must exceed $60 and perhaps $70 to render it valuable. Take a vein varying from ten to fifteen feet thick, loaded with ore that will average anything near $40 per ton, and the new chlorodizing furnace would render it the grandest mining property in the State."

Colorado.

IRON AND COPPER SMELTING AT GOLDEN CITY.

The establishment of smelting works at Golden City for the reduction of the iron and copper ores in that locality, of which so much has been said for several months past, is at length an established fact. The Golden City *Transcript*, November 24th, has the following account of the successful trial of an initiatory furnace, in which native coal was used to smelt the ores. It says: "Mr. Silas Bertenshaw and Mr. H. J. Parker have, for two or three weeks, been engaged upon the construction of a reverbatory furnace with the view of using our coal for the smelting of these ores, and regarding it somewhat in the light of an experiment, we were requested to refrain from mentioning it until they had proved it a success. The furnace was finished on Saturday, and a fire lighted for the purpose of drying it. On Monday it was tried again, and found to work to their entire satisfaction, the blaze from the coal giving an intense heat, sufficient to melt sheet copper in a very few minutes. Yesterday they had in a charge of cast iron, but the early hour at which we went to press affords us no opportunity of giving the result, but the projectors have no doubt of the entire success of the enterprise. They are to receive some of the copper ores to-day from the mines on the Central road, above Golden Gate, which will be smelted to-morrow.

"Thus we have the pleasure of announcing the establishment of the pioneer smelting works in the valley, which we believe to be only the forerunner of other and extensive works of the same kind here at Golden City, to be fed from our mines as well as those from Gilpin and Clear Creek counties. Messrs. Bertenshaw & Parker deserve great credit for their enterprise in thus demonstrating the fact that our raw coal can be used in reverbatory furnaces for smelting ores.

"In connection with this subject, we are glad to say that other parties here are prepared to go on with a furnace at once, with a capacity from five to ten tons. Now that the one noticed above has proved a success, we understand they will commence operations at once."

THE MINES AND MILLS OF GILPIN COUNTY.

A correspondent of the Denver *News*, November 17th, thus reviews the mining interests in Gilpin county: "Passing from the silver regions of Georgetown we come to the gold mines and stamp mills of Gilpin county. About Central the season has been one of great activity. The number of stamps run, the amount of ore crushed, and the product of bullion have all been largely in excess of last year. This increased activity has been attended with renewed confidence and hope, both founded, I am glad to note, on a much surer basis than they wore in the times when speculation was rampant, and 'new processes' at a heavy premium. My notes for this article are not as extensive as I would wish them to be, for reasons which will be explained hereafter. The few I did get, however, will be fully given for the benefit of the reader.

"THE STAMP MILLS.

"The following is a list of the stamp mills now in operation, and which will doubtless continue to run during the winter:

MILLS.	Number of stamps.	Cords of ore crushed per week.
Barrett & Co	30	15
Petter & Hawley	15	9½
Clayton's	12	7⅛
Sullivan's	12	7
Whitcomb's	12	8½
LaCrosse	12	7½
Malley & Abbey	25	12
Woodbury	23	18
New York	55	40
Consolidated Gregory	50	40
Black Hawk	80	35
Fitzpatrick's	10	8
Empire	20	12
Hurd's	20	13
Rocky Mountain Gold Company	20	14
University	15	10
Mead's	20	14
Holbrook	13	9½
Fullerton's	15	10
Star	24	14
Tomlinson	12	7½
Geaty	8	5
Sterling	15	12
Smith & Parmelee	25	18
Briggs	25	36
Cheney's	12	6
Brastow's	20	14
Illinois	22	12
Leavenworth	12	6

"The totals of these figures are: mills, 29; stamps, 624; cords of ore crushed per week, 421. Estimating seven tons to a cord, we have 2,947 tons of ore crushed per week. It must be noted, however, that a few mills are not embraced within this list, the number being six, if I remember correctly. These mills I had not time to visit, so that the whole number of mills running would be thirty-five, while the number of stamps and the amount of ore crushed per week would also be somewhat increased. Probably 700 stamps and 3,250 tons of ore per week would be a fair statement of what is being done. This is the winter basis, and does not include the mills which run during the summer, and are now shut down for the winter. In Nevada alone this amounts to sixty stamps.

"A FEW AVERAGES AND FIGURES.

"The average amount of ore crushed per week to the stamp is 4 and 9-14 tons, or sixty-five eighty-fourths of a ton per day to the stamp. The heaviest stamps in use weigh 850 pounds, drop fifteen times per minute, and crush an average to the stamp of 3 and 1-16 tons per week. The lightest stamps used weigh 400 pounds, drop thirty times per minute, and crush an average to the stamp of 4⅜ tons per week. Stamps weighing 450 pounds, dropping thirty times per minute, crush 4¾ tons to the stamp per week; dropping thirty-two times per minute crush 4 and 23-24 tons to the stamp per week. The highest speed of stamps weighing 500 pounds is forty drops per minute, and the amount of ore crushed is 4 and 9-10 tons to the stamp per week. The lowest speed of 500 pounds stamps is twenty-four drops per minute, and the amount of ore crushed is 4 and 1-5 tons to the stamp per week. The average speed of eight mills, running 500 pound stamps, is thirty-one drops per minute; the highest speed of 550 pound stamps is forty drops per minute, crushing an average of 10 and 2-25 tons to the stamp per week. The lowest speed of 550 pound stamps is thirty drops per minute, crushing in one mill 5¼ tons per week to the stamp, and in another 5 and 1-11 tons per week to the stamp. I might carry these averages further, but I do not regard it necessary. It will be noticed that the heaviest stamps, running at the lowest rate of speed of fifteen drops per minute, crush only 3 and 1-16 tons to the stamp per week, while the average stamps, weighing 550 pounds, and dropping forty times per minute, crush 10 and 2-25 tons to the stamp per week. This gives a difference in favor of the lighter stamps and faster drop of 7 and 7-400 tons per week to the stamp. To say that these comparisons are taken from the Black Hawk mill and the Briggs mill is almost unnecessary, as the fact will be recognized by all of my Gilpin county readers. The former, with eighty heavy stamps, is crushing seven tons of ore less per week than is the Briggs mill with twenty-five stamps of the weight and running at the speed previously named. The mill is crushing an average of 1 and 1-20 tons per day to the stamp, an excess of 29-105 of a ton over the general average for all the stamps. This is the most successful stamp milling ever done to my knowledge in Gilpin county.

"MISCELLANEOUS MINING ITEMS.

"Among the large companies working are the Smith & Parmalee, Briggs, Black Hawk, and Consolidated Gregory. The Ophir, Grinnel, Rocky Mountain, Sensenderfer, Narragansett, and a number of companies on the Bobtail are shut down. Among the really successful mines are the California and U. P. R., which are, and have been, yielding their owners large profits. As they are private and personal enterprises it is exceedingly difficult for newspaper men to get any figures for publication. I am sure, however, that were this possible, it would go far toward solving the problem of 'how mines can be made profitable.' The celebrated Coaley lode is probably not surpassed in Colorado as a paying silver mine. Its total yield this season has been about $66,000. Of this amount $16,000 were realized from forty tons of ore, at an average of $400 per ton. The average price for crushing ore is $30 per cord. The supply of ore during the past summer has been about equal to the demands of the mills, and I do not know but it will now be in excess. The shutting down of so many of the Nevada mills necessitates the hauling of a good deal of ore from lodes in that vicinity to Black Hawk for crushing. This is attended with an expense which cuts down the profits to a very small percentage. The operations of the Briggs mill have been noted. It should now be added that they have been taking out their old stamps and are putting in new ones. Twenty-five are now in operation, and twenty-five more will be ready to run in a few weeks. The mill formerly contained fifty stamps, weighing 650 pounds, and dropping twenty-two times per minute. With this mill they crushed thirty-six cords, or 252 tons, per week. The twenty-five new stamps are doing the same work done by the old fifty, and when the entire fifty new ones are put in operation the capacity of the mill will be doubled.

"PROF. HILL'S WORKS.

"Notwithstanding the great outcry against Prof. Hill, I am glad to say that he is continuing his operations successfully. His supply of ore is about sufficient to keep his two furnaces in operation for about seven months in the year, and one furnace for the remaining five months. Many of the men who were his most active opposers a year or more ago are now selling him his largest supplies of ore. Most of the outcry against him arises from an ignorance of what he does, for he is a man who attends to his business and does not make the world his confident. That he has not made, and is not making the profits charged to him, is a fact I have the best of reasons for stating, and expect at some time to be able to prove to the public. He is paying a higher price for gold ores than can be realized any other way; is using large amounts of capital; taking heavy risks, and increasing our gold product to such an extent that we have no word of sympathy for any who are attempting to berate him. That his works are a success scientifically and financially—as they ought to be—is a fact well known, and that they may remain a financial success is for the best interests of Gilpin county as well as of Colorado."

California.

ALPINE COUNTY.—The Monitor *Miner*, November 13th, says: "The lower tunnel of the Tarshish mine is being driven at an encouraging rate. It is now over 100 feet long, and from 15 to 20 feet is being added therto weekly. Four men were put at work taking out ore from the upper works on Tuesday, and some very good ore has been placed on the dump this week; forty or fifty sacks of it the soft or pocket ore. Single hand drills are being used now in the upper works."

AMADOR COUNTY.—The *Ledger*, November 13th, says: "The American Company, at Amador City, are enlarging their mill by adding twenty stamps, which will give them forty in all. New boilers and other machinery will also be added. At present, with twenty stamps, they are taking from $25,000 to $30,000 per month.

"Mr. Tibbits, superintendent of the Summit mine, says that they have struck, in the 400-foot level, ore that will pay $100 to the ton. The ledge is one foot wide, and increasing.

"The newly-erected chlorination works at Sutter Creek are in full operation, and work successfully. We saw a gold brick Sunday, from sulphurets taken from the Eureka mine."

CALAVERAS COUNTY.—A correspondent of the *Chronicle*, November 13th, thus writes of mining affairs at Railroad Flat: "Barney & Co. have just finished crushing their last lot of rock with a gross yield of $43 per ton; expenses of mining, hauling, and crushing, $10 per ton. The Hilaria Company have worked a lot of forty tons, at the Vance mill, yielding $30 per ton, with an abundance of the same ore in sight. The Lewis Bros. are working what they call the 'little vein.' The only crushing made from this mine was a lot of forty tons, in two parcels, first and second class, nearly equal in quantities. The first yielded $214 per ton, and the second $46! Since working the first lot they have been constantly taking out ore equally rich. The large vein alluded to as Lewis's first discovery, has been sold to Mr. Gashwiler for $30,000. The main shaft, 64 feet in depth, with a 40-foot level at the bottom, shows a 3-foot vein of first-class rock, some of it rivaling the Palomo specimens. The south extension is owned by Sheldon, Folsom & Co., who are sinking a shaft. At the time of my visit they were down thirty feet, vein large, and prospects good.

"In placer mining, W. V. Clark, with a ditch 26 miles long, and miles of hydraulic pipe, is doing more to enrich the State than any other individual I know of. The quartz mines rank second to none. The Petticoat has, by actual measurement, 300 feet of quartz in the level on the vein from the bottom of the 200-foot shaft. The level in one of its swells reaches a width of fourteen feet; its average is three. In the head of the level the vein is solid five feet, and prospects $20 a ton. A heavier engine is to be purchased."

NEVADA COUNTY.—We condense from the Grass Valley *Union* the following items: "The yield of Perrin's mine for October was $11,200, and the total expense was $2,058, making a dividend of $9,143. The ledge looks better the deeper it is worked. The rock can now be taken out much more rapidly than it can be crushed, and the miners are some six hundred loads ahead of the mill.

"The Little York Water & Mining Company have purchased the claims of Timmons & Pattison, of Little York, and the balance of the Pattison ditch for $14,000. This will give the company nearly all the mining ground around Little York and Liberty Hill. They have just finished enlarging the Pattison & Maguire ditch at a cost of $5,000. They will use 2,000 inches of water the coming season. They have 10,000 feet of iron pipe carrying water to five sets of claims. They employ 20 men. The gross receipts last year from three sets of claims were $70,000.

"The Vigilant Company are putting up a new mill, constructed on a new principle, the steam acting directly on the stamps, of which there are but two. The company have out a considerable quantity of rock, and the ledge being of good size, the mill can be kept supplied. One hundred and seventy-five pounds of powder were recently exploded at a single blast in the claims of Marselus & Maltman. The shock was felt a mile from the claims. From appearances, the blast did better execution than usual—the surface of the ground being cracked in every direction, and for some distance."

A Sierra Valley correspondent of the Downieville *Messenger*, writes, November 6th, as follows of the Meadow Lake mines: "The rose-colored account of the mines at Meadow Lake prove a baseless story. Parties have arrived in the valley, bringing doors, windows, and house furniture, and declare that all the processes have failed to get any gold in paying quantities from the rock. After four years' time and the expenditure of many thousands of dollars, the most tenacious prospector now is satisfied that there is no gold there. The once populous town of Meadow Lake will be entirely deserted this winter. S. P. Whipple, for some time owner of Fordyce Valley, near the lake, has sold to a stock man, and starts soon for his early home in Michigan."

SAN DIEGO COUNTY.—A telegram of the 10th inst. says: "San Diego is excited over the reported discovery of rich gold mines 60 miles from that town. Quantities of dust and lumps of gold worth $10 are brought in. The precise location is kept as secret as possible. Parties are leaving here for the new diggings.

"SHASTA COUNTY.—The Clear Creek ditch was recently sold at Sheriff's sale for $3,000. The same property, in times past, figured on the assessment roll of the county at a valuation of $75,000.

"TUOLUMNE COUNTY.—The last clean up of the Confidence mine yielded $3,000. The owners are so well satisfied with the prospects that they are adding ten stamps to the mill, which will increase its capacity to thirty.

Idaho.

THE MINES AND MILLS.

"The mines which are now being worked," says the Owyhee *Avalanche*, November 13th, "never looked so promising as they do at present. The Ida Ellmore and Golden Chariot continue to furnish the usual quantity of rich ore. And the recent development of a large and well-defined ledge in the Poorman mine, proves to be a permanent thing, the lead is widening, and the quality of the ore is getting better as work progresses upon it. The Baxter, which had been lying idle for some time, is now being worked, and the indications are very favorable indeed. We saw a specimen of silver ore taken from it this week, the finest we have seen extricated from any mine in camp. It was taken from the bottom of the shaft, which is over 250 feet deep. Reports from the Red Jacket, Peck & Porter, Allison, and Potosi, are favorable. The Twilight, at Flint, now being worked by contract, by Mr. W. H. Clark, is said to be turning out well. And this week we publish an advertisement of an assessment which has been levied on the stock of the Rising Star Company. We have been informed that work will be resumed on this mine in the spring.

"The mills now running in camp are the Ida Ellmore, New York, and Webfoot. The Minear and Cosmos have been running until within a few days. The Shoenbar, we have been informed, will start up on Baxter in a few days."

FROM THE BASIN.

We clip the following items from the Boise City *World*, of the 4th: "Judge Shepherd had returned from Loon creek. Pack trains will make no more trips from Oro Grande to Idaho City this fall. Supplies are abundant now at Loon creek. Claims are paying from $12 to $32 per day to the hand. The agency of the First National Bank of Idaho, has shipped from Idaho City to New York, for the month of October, 54 bars of gold, valued at $67,067 94. Rain in abundance has fallen, which augurs well for a prosperous mining season next year."

New Mexico.

The Elizabethtown *Telegraph*, November 6th, has these items of mining news: "The Aztec mill has turned out $2,000 in the last two days. The Central Company, on Mono Creek, are doing well. The Montezuma mill, thirty stamps, commenced its run three days since, and is doing as well as even the Aztec. These two mills are chiefly owned by Mr. Maxwell, as are also the lodes. The Ayroa Honda quartz mill, twenty stamps, run by a double turbine wheel, commenced running four weeks since, on thirty tons of ore. The result was very small. There has been something wrong in the management. The rock contains visible free gold."

Montana.

THE NEW DIGGINGS ON THE BIG PIPESTONE.

The placer mines which were recently discovered on the Big Pipestone, by a party of prospectors, are turning out rich, if all accounts from that region are to be credited. Mr. Flowers, of Highland Gulch, lately paid a visit to these mines. He says there are already a large number of claims thoroughly prospected, and some of them are being worked with great success, yielding as high as $20 per day to the man. The gold, which is coarse, is of very fine quality. The Big Pipestone creek is about eight miles from White Tail Station, in a northwest course.

British Columbia.

NEW RICH PLACER DIGGINGS.

A despatch, dated Victoria, November 7th, says: "News from the mainland to-day indicates a new strike of rich placer diggings on Finlay Branch at Peace River. The diggings were struck by a prospecting party, who returned for provisions, bringing $11,090 in gold. Many Cariboo miners are preparing to move up to the new diggings, which are said to exceed those of Cariboo in richness."

Oregon.

The *Sentinel*, Nov. 6th, says: "We learn that a Mr. Turnbull took out of a claim on Althouse creek, a few days since, a nugget valued at $107. The mining prospects at that place are quite flattering, and the price of claims has gone up. The miners are working back into the hills."

Wyoming.

SWEETWATER.—A Mr. Cramer informed the Omaha *Republican*, of November 5, that Robert's mill commenced running the previous week, and 200 tons of ore were expected to be crushed in one run. The mills are being run day and night, and will continue all winter.

MARKET REVIEW.

The Coal Trade.

NEW YORK, Dec. 3, 1869.

ANTHRACITE COALS.

WHOLESALE.—The market is in a very unsettled condition, and there is but little inquiry for coal from city retailers. Out-of-town dealers, who are anxious to get a supply before navigation closes, are purchasing odd lots. The low prices that coal brought at the last auction sale does not seem to have materially affected the market for stove size, which is readily selling to-day at $8 25 @ $8 50. The larger sizes, however, being in plentiful supply, have fallen off considerably in price, as the examination of our quotations will show. Navigation will no doubt close in a few days, if the severe weather we are now having continues, the amount of coal received at the shipping points will be materially lessened. The demand from out-of-town dealers will also fall off, and we would not be surprised if prices gradually declined for the next month, inasmuch as surplus will grow on the market. Those parties out of town who can be supplied by rail would do well perhaps to measure their wants closely before purchasing.

BITUMINOUS COALS.

There is an increasing demand for soft coals, and prices have advanced to $7 50 at this point. This advance is due to an increase in freights from Baltimore and Alexandria.

RETAIL.—The cold weather of the past few days had just started up a lively business when the announcement of the Pennsylvania Coal Company offering Grate and Egg coal at $7 50, and Stove at $8, delivered, upset things generally. Other dealers, however, have not lowered their prices, and Lackawanna and Wilkesbarre coal is yet selling at $9 50 and Lehigh $10 and $10 50 for stove size.

FREIGHTS.—Freights coastwise have not materially altered since our last quotations. We quote Boston $1 85; New Haven $1 25.

ITEMS.

Our Philadelphia correspondent reports the market as having been very dull and depressed during the past week. Trade is about over for this fall, very few orders coming in. Some of the mines in the Schuylkill region have shut down, and it is reported that many more will stop work on Saturday, Dec. 4th. Our Boston letter notes dull trade and a full market. Prices have declined during the past week, in sympathy with the news of the Scranton sale in New York. From the various mining regions there is very little news of interest. Operaters are pushing all the coal forward they can before the close of navigation.

The Pottsville *Miners' Journal* states that "the Committees of the Operators and Working Men's Benevolent Association met Nov. 26, and settled the rates of wages for the month of November, on a basis of $3 75 per ton as the average sales of coal for the month. This is 25 cents advance on the October rates for coal, and makes the advance 15 per cent. on the basis which was fixed in May last at $3 a ton at Port Carbon for coal, and wages for miners at $11: inside laborers $12, and outside laborers $11 a week, and contract work in the same proportion. Notwithstanding Mr. Siney's letter, the prices were furnished by the dealers. We understand everything was adjusted amicably, and good feelings prevailed. This is as it should be, and will be, if a straightforward and honest policy is pursued by both parties. Even those operators who were opposed to the Basis system at first are becoming converts, and admit that it works much better than they expected."

The following table exhibits the quantity of Coal passing over the following routes of transportation to tide-water, for the week ending November 27, 1869, compared with the same time last year:

COMPANIES.	1868. WEEK.	1868. TOTAL.	1869. WEEK.	1869. TOTAL.
Phila. & Reading R.R.	89,846	3,328,230	113,211	3,610,461
Schuylkill Canal	33,299	946,615	28,267	646,317
Lehigh Valley R. R.	36,315	2,225,630	60,000	1,997,763
Lehigh and Sus. R. R.	12,631	474,942	35,258	856,969
Lehigh Canal	20,995	938,159	6,485	593,559
Scranton North	10,718	569,635	12,071	399,691
" South	26,882	988,643	34,162	951,259
Penn. Coal Co., rail	19,285	851,541	25,225	872,585
" " canal	706	29,005	834	18,707
Del. and Hudson, rail			3,575	141,695
" " canal, north	44,196	1,576,061	54,365	1,112,540
" " " south			4,492	116,583
Shamokin	9,968	462,693	12,781	430,570
Trevorton	936	31,476	1,944	32,237
Short Mountain	3,487	111,155	2697	19,800
Lykens Valley Coal Co.	1,809	81,699	2,918	74,685
Huntingdon & Br'd Top	6,198	248,864	9,042	328,331
Wyoming South	13,611	319,764	12,924	329,630
" North	13,469	87,686	13,558	76,308
Williamstown, Col'y.	6,503	178,467	7,054	195,388
Total	382,894	13,190,469	436,898	12,933,565
1869		12,933,565	382,894	
Decrease year		256,904	in 54,004	week

Schuylkill Coal Trade.

Report of coal transported over the Schuylkill Canal for the week ending Thursday, November 25, 1869.

	Tons. Cwt.
From Port Carbon	9,963 10
" Pottsville	435 14
" Schuylkill Haven	15,082 12
" Port Clinton	725 00
Total for week	26,206 16
Previously this year	620,129 18
To same time last year	946,615 08

Report of coal transported over the Philadelphia and Reading Railroad during the week ending Thursday, Nov. 25, 1869.

	Tons. Cwt.
From St. Clair	39,529 17
" Port Carbon	9,555 14
" Pottsville	5,980 11
" Schuylkill Haven	53,814 19
" Auburn	4,612 03
" Port Clinton	16,728 09
" E. P. R. R.	253 00
" Harrisburg and Dauphin	12,651 03
Total paying freight	122,934 16
Coal for Company's use	3,289 13
Total for week	126,224 09
Previously this year	4,021,830 08
Total	4,148,054 17
To same time last year	3,508,376 06

Report of Coal Transported over Lehigh Valley Railroad

For the week ending November 20, 1869, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREVI'S Y. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Mahanoy	10,630 03	412,717 10	409 547 18
" Beaver Meadow	14,505 06	391,930 10	406,433 07
" Mauch Chunk		827 03	827 03
" Upper Lehigh		8,581 11	8,581 11
" Hazleton	36,789 16	750,955 17	787,744 18
" Wyoming	14,257 09	436,097 04	450,354 18
Total	82,180 14	2,001,109 06	2,083,290 00
To Lehigh & S. R. R., at P'n. Hav. for rail		4,562 07	4,562 07
Do. for canal	91 00	121,620 12	121,315 01
At Mauch Ch'k for canal	2,570 14	98,035 15	101,003 00
Total Anthracite	84,842 08	2,225,328 00	2,310,170 08
Bituminous Coal recv'd from Cata. R. R.			
N. C. R. R.			
E. P. R. R.	4,667 00	16,560 00	21,237 00
P. & N. Y. C. & R.R. Co			
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	89,519 08	2,241,888 00	2,331,407 08
Same time last year	69,369 01	2,533,733 10	2,603,102 11
Increase	20,150 07		
Decrease		291,845 10	271,695 03
Forwarded East from M'h Chunk by rail	77,535 08	1,937,761 03	2,015,296 11
Same time last year	56,315 19	2,169,314 03	2,225 630 02
Increase	21,219 09		
Decrease		231,553 00	210.333 11

RECAPITULATION.

Forwarded East from M'h Chunk by rail	77,535 08	1,937,761 03	2,015,296 11
Delivered at M'h Chunk	40 11	924 12	965 03
Delivered on line of road above Mauch Chunk	357 08	8,265 14	8,623 02
Delivered above M. Chunk for use of L. V. R.R.	1,464 19	42,586 07	44,051 06
To N. C. R. R., at Mount Carmel		2,516 09	2,516 09
Forwarded North from L. & B. Junction	2,644 01	4,753 18	7,397 19
To L. & S. R.R., at P'n Hav., for railroad		4,562 07	4,562 07
Do. for canal	91 00	121,620 12	121,315 01
Do. Packerton for rail	138 07	4,301 03	4,439 10
At M Chunk for canal	2,570 14	98,035 15	101,003 00
Total Anthracite	84,842 08	2,225,328 00	2,301,170 08
Bituminous Coal	4,677 00	16,560 00	21,237 00
Total all kinds	89,519 08	2,241,888 00	2,231,407 00

Cumberland Coal Trade.

B. & O. RAILROAD.

The shipments over the Baltimore & Ohio Railroad for the week ending Nov. 20, 1869, were as follows:

From George's Creek via Piedmont.	Tons.
George's C. C. & I. Company	1,917 03
Maryland "	45 00
Franklin "	1,055 05
Central "	2,108 09
Atlantic "	1,179 15
Piedmont "	1,568 06
Swanton "	775 08
Potomac "	1,651 14
Barton "	2,055 12
American "	874 06
Hampshire "	513 17
Total.,	13,724 15

BY C. & O. CANAL.

For the week ending Nov. 20, 1869, the shipments by the Chesapeake & Ohio Canal were as follows:

	Tons.
American Co.	2,414 19
Borden Co.	1,150 16
Central Co.	998 05
Consolidation Co.	3,097 10
C. C. & I. Co.	1,094 05
George's Creek Co.	780 13
Hamp. & Baltimore Co.	769 09
For private parties	3,217 06
Maryland.	329 15
Total for week	15,052 18

Lehigh and Susquehanna Railroad.

Report of Coal Shipped South for the week ending Nov. 27, 1869.

WHERE FROM	WEEK. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Mauch Chunk Region	12,962 19	215,864 19
" Hazleton "	83 08	123, 54 04
" Upper Lehigh "	25 00	77,218 12
" Wyoming "	24,610 01	745,378 14
Grand Total	37,681 08	1,158,814 09
Corresponding week last year	28,188 12	948,246 11
Increase	9,492 16	211,567 18
Decrease		
Forwarded South from Mauch Chunk	34,141 15	801,307 02
Delivered on line of Lehigh & Sus'na R. R., above Mauch Chunk	963 08	32,229 01
Delivered to Lackawanna & Bloom. R. R., at Plymouth Bridge	156 17	18,251 10
Delivered to Lehigh Valley R. R. Co., at Sugar Notch		5,151 03
Delivered at Coal Port, for shipment by Canal	2,427 10	301,418 00
Total	37,681 08	1,158,814 09

Lehigh Canal Coal Trade.

Shipped for the week Ending November 27, 1869.

WHERE FROM.	WEEK. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Mauch Chunk Region	1,929 10	191,042 12
" Beaver Meadow "	1,106 02	96,611 19
" Mahanoy "	92 14	2,624 15
" Hazleton "		118,035 00
" Upper Lehigh "		5 142 07
" Wyoming "	2,756 09	185,103 13
Grand Total	6,484 15	598,159 16
Corresponding week last year	30,995 01	968,159 16
Increase		
Decrease	24,501 06	369,600 10

Prices of Coal by the Cargo,

[CORRECTED WEEKLY.]

SCHUYLKILL.	AT NEW YORK, Dec. 3. R. A.	W. A.	AT PHILADELPHIA, Dec. 3. R. A.	W. A.
Lump	$— —	$6 00	— —	6 00 to — —
Steamer	— —	6 00	— —	6 00 to — —
Broken	— —	6 50	— —	6 00 to — —
Egg	8 25 to 8 75	7 25	— —	6 50 to — —
Stove	8 25 to — —	8 00	— —	6 50 to — —
Chestnut	6 00 to 6 50	6 00	— —	6 00 to — —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump	— —	8 50	— —	— —
Steamer	— —	8 50	— —	— —
Broken	— —	8 00	— —	— —
Egg	— —	8 00	— —	— —
Stove	— —	8 50	— —	— —
Chestnut	— —	7 00	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*	R. A.			
Diamond Vein	8 50		— —	— —
New England	"		— —	— —
Locust Dale	W. A. 8 00		— —	— —
Honey Brook, Le'h	W. A. 7 00 to 7 50		— —	— —
Spring Mount	" " 7 00 to 7 50		— —	— —
Sugar Creek	" " 7 00 to 7 50		— —	— —
Sugar Loaf	" " 7 00 to 7 50		— —	— —
Fulton	" " 7 00 to 7 50		— —	— —
Stout	" " 7 00 to 7 50		— —	— —
Old Comp'y's	" " 7 00 to 7 50		— —	— —
Cross Creek	" " 7 00 to 7 50		— —	— —
Chauncey	" "		— —	— —
Girardville	" "		— —	7 00 to 7 50
McMichael	" "		— —	7 00 to 7 50
Duncan	" "		— —	— — to 8 00
Shamokin	" "	7 50	7 00	— —
Lykens Valley	" "		— —	— —
Broad Top	" "		5 00	— —
Hill & Harris	" "		7 00	— —
Henry Clay	" "		7 00	— —
Powelton	" "		6 50	— —
Burnside	" "		— —	8 00
BITUMINOUS COALS.				
Kittaning Coal Co.'s Phœnix Vein			f.o.b. at Phila.	$5 25
" " Lemon			" "	5 00
Cumberland C. & I. Co.'s on board			N. Y.	7 50
Central C. & M. Co.'s			"	7 50
Consolidated Coal Co.'s			"	7 50

[*Dealers in these coals may be found in our advertising columns.]

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Cst.
Scranton at E. Port	— —	— —	— —	— —	— —	— —
Pittston at Newb'g	— —	— —	— —	— —	— —	— —
Lackawana at Rond't.	6 50	6 50	6 75	7 25	8 00	6 50
Wilk'b're at Hoboken.	6 00	6 00	6 50	6 75	7 75	6 25
Old Co. Lehigh at Pt. Johnston	7 00	— —	6 25	7 00	7 50	6 25

For freights to different points, see "Freights."

Prices for Coal at Mauch Chunk.

	F.L.	Bro.	Gra.	Eg.	Sto.	Cst.
Lehigh	$4 25	$4 75	$4 75	$4 75	$5 00	$4 25
Wilkesbarre	4 25	4 75	4 75	4 75	5 00	4 25

For freight to Elizabethport and to New York see "Freights."

Prices of Foreign Coals.

November, 1869.
Duty $1 25 per ton.
Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 9 50@— —
" " Cannel	14 00@— —
" House "	17 50@18 00
" " Orrel	16 00@18 00
Per ton 2,240 lbs., ex-ship.	
PRICES FROM YARD.	
Liverpool House Orrel, screened	$16 00@18 00
" " Cannel, "	18 00@19 00
Per ton 2,000 lbs., delivered.	

Prices of Gas Coals.

November, 1869.

PROVINCIAL.

Duty, $1 25.	Coarse. Gold.	Slack. Gold.
Block House	$1 75	@— 75
Gowrie	1 75	@— 75
Lingan	1 75	@— 75
Sydney	2 13¼	@— 71¼
Pictou	2 13¾	@1 18¾
Little Glace Bay	1 50	@1 00
Caledonia	1 50	@— 75

AMERICAN.

	Coarse. Currency.	Slack. Currency.
Westmoreland Co.	— —	@— —
Despard Coal Co.	$8 50	@8 00
Penn.	— —	@— —
Newburg Orrel Gas	— —	@— —
West Fairmount Gas Coal	— —	@8 00
AT PHILADELPHIA.		
Powelton	$7 80	

Prices at Baltimore—NOV. 1869.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$7 50@8 00
Pittston and Plymouth	7 25@8 75
Shamokin Red or White Ash	6 50@7 00
Lykens Valley Red Ash	7 40@7 80
Trevorton, Red Ash	— —@— —
By retail, per ton of 2240 lbs. delivered	9 00@9 75
Georges Creek & Cumberland f. o. b. at Locust Point for shipping	4 85@5 00
West Fairmount Gas f. o. b.	— —@6 50

Prices at Georget'n, D.C., & Alexandria, Va.

November, 1869.

George's Creek and Cumberland f. o. b. for shipping..$4 75

Prices at Havre de Grace, Md.

November, 1869.

Wilkesbarre and other White Ash for cargoes	$— —@7 25
Lykens Valley	— —@7 50
Shamokin Red or White Ash	— —@7 25
Trevorton and Zebra Valley	— —@7 00

Freights.—NOVEMBER, 1869.

TO EASTERN PORTS.	From Philadelp'a.	From E. Portand Port Johnston.	From Newburg.	From Rondout.
Stamford	$2 00	$1 15	$1 30	$1 25
Norwalk	2 00	1 15	1 30	— —
Bridgeport	2 00	1 15	1 30	1 25
New Haven	2 00	1 15	1 25	1 25
Hartford	2 75	1 75	— —	1 90
New London	2 00	1 40	1 60	1 60
Norwich	2 00	1 40	1 60	1 60
Mystic	2 00	— —	1 45	— —
Stonington	2 00	1 50	1 60	1 60
Sag Harbor	2 00	1 25	1 45	— —
Bristol	2 25	1 40	1 55	1 55
Newport	2 25	1 40	1 55	1 45
Fall River	2 25	1 45	1 55	1 50
Providence	2 25	1 40	1 60	1 60
Dighton	— —	— —	1 60	— —
Warren	— —	— —	1 60	— —
Pawtucket	2 25	— —	1 75	1 65
New Bedford	2 25	1 50	— —	1 75
East Cambridge	3 10	— —	1 85	2 10
Salem	3 10	2 00	2 20	2 20
Newburyport	3 10	2 00	1 85	2 20
Portsmouth	3 10	2 00	2 10	2 10
Rockport	— —	— —	1 90	— —
Saco	3 25	2 00	— —	2 00
Portland	3 25	2 00	2 20	— —
Bangor	3 25	— —	1 75	1 80
Bath	3 25	2 00	2 00	2 00
Middletown	— —	1 50	— —	— —
Amesbury	3 25	— —	— —	— —
Boston	3 10	2 00	2 25	2 25
Cambridgeport	3 10	— —	1 85	2 05
Taunton	3 10	2 00	1 85	— —
Derby	2 00	1 25	1 90	— —
New York	1 55	80	85	85
Hackensack	1 75	— —	— —	— —
Jersey City	1 65	80	85	85
TO RIVER PORTS.				
Troy	1 75	1 25	60	65
Albany	1 75	1 24	55	50
Coeyman's	1 60	— —	55	50
Stuyvesant	1 50	— —	50	45
Cocksackie	60	— —	45	45
Hudson	— —	90	40	50
Catskill	— —	— —	40	35
Poughkeepsie	1 60	75	30	25
Fishkill	1 60	— —	20	30
Cold Spring	1 60	70	30	50
Haverstraw	— —	50	45	55
Nyack	1 60	50	55	50
Sing Sing	1 60	— —	60	50
Yonkers	— —	40	60	55
New York	1 55	80	70	— —
Saugerties	1 55	— —	35	30
Rhinebeck	1 60	— —	30	35
Rondout	1 40	60	30	25
Tarrytown	1 60	80	60	— —
West Point	1 60	75	30	50

Foreign and Provincial Freights.

November, 1869.

Foreign.	
Newcastle and Ports on Tyne	£15@£17 keel
Liverpool	15s. —, do
TO NEW YORK.	
Provincial	
Sidney	$3 25
Lingan	3 25
Cow Bay	3 25
Port Caledonia	3 25
Little Glace Bay	3 25
TO BOSTON.	
Sydney	$2 75
Lingan	3 75
Cow Bay	3 25
Port Caledonia	3 00
Little Glace Bay	2 25

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven	$ 40
Bridgeport	40
Southport	40
Westport	40
Norwalk	40
Stamford	40
	Per Boat.
Greenwich	$70 00
Port Chester	80 00
Mamaroneck	70 00
Glen Cove	55 00
New Rochelle	55 00
East Chester	60 00
West Chester	30 00
White Stone	30 00
College Point	25 00
West Farms	25 00
Flushing	30 00
Harlem and Mott Haven	20 00
Port Morris	20 00
Ninety-first street and Astoria	16 00

Boats beyond Port Chester, with less than 200 tons, $20 per Boat.

TO RIVER PORTS.

Boats of 150–250 Tons.

	Per Ton.
To Manhattanville	9 cents.
Spuyten Duyvil	9 "
Yonkers	10 "
Hastings	12 "
Piermont	15 "
Dobbs' Ferry	15 "
Nyack	16 "
Tarrytown	17 "
Sing Sing	18 "
Croton Landing	19 "
Haverstraw	19 "
Verplanck's	20 "
Peekskill	20 "
West Point	21 "
Cold Spring	21 "
Newburgh	22 "
Poughkeepsie	22 "
Rondout	23 "
Boats of 100 Tons	Per Boat.
To Manhattanville, and Return	$12 00
Spuyten Duyvil	14 00
Yonkers	15 00
Sing Sing	25 00
Peekskill	25 00

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven	$2 50
From Port Carbon, 8 cents per ton more.	
TO ELIZABETHPORT.	
L. V. Railroad from Mauch Chunk to Easton	$1 15
C. R. R., N. J., Easton to Elizabethport	1 70
Shipping expenses at Elizabethport	25
Total	$3 10
TO PORT JOHNSON.	
L. V. R. R.	$1 15
C. R. R., of N. J.	1 80
Shipping expenses	25
Total	$3 20
TO ROBOKEN.	
L. V. R. R.	$1 15
Morris & Essex R. R.	1 80
Shipping expenses	25
Total	$3 20
TO SOUTH AMBOY.	
L. V. R. R.	$1 15
B. & D. R. R.	1 10
Cam. & Am. R. R.	50
Shipping Expenses	25
Total	$3 00

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.	
From Schuylkill Haven	$1 70
" Port Carbon	1 70
" Port Clinton	1 70
TO NEW YORK.	
From Schuylkill Haven	$2 20

Via Lehigh Canal.

TO PHILADELPHIA.	
Lehigh Canal	$1
Freight and towage	1 1½
Total	$2 29
TO NEW YORK.	
Lehigh Canal	$ 71
Morris "	85
Freight	1 70
Towing	10
Total	$3 36
TO JERSEY CITY.	
Lehigh Canal	$ 71
Morris "	95
Freight	1 60
	3 25
For re-shipment	30
Total	$3 56

Via Delaware and Raritan Canal.

TO NEW YORK.	
Lehigh Canal	$ 71
Delaware Division Canal	43
Delaware and Raritan Canal	57
Freight	1 45
Towage	20
Total	$3 36
TO NEW BRUNSWICK.	
Lehigh Canal	$ 71
Delaware Division Canal	43
Delaware and Raritan Canal	57
Freight	1 20
Total	$2 91

For Re-shipment—30 extra for shipping, and 10 cents. drawback.

METALS.

IRON.—Duty: Bars, 1 to 1½ cents ₱ lb; Railroad, 70 cents ₱ 100 lbs.; Boiler and Plate, 1½ cents ₱ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ₱ lb; Pig, 9 ₱ ton; Polished Sheet, 3 cents ₱ lb.

Pig, Scotch No. 1, ₱ ton	34 50@36 00
Pig, American, No. 1	39 00@40 00
Pig, American, No. 2	37 —@38 —
Pig, American, Forge	36 —@— —
Bar, Refined, English and American	85 —@— —
Bar, Swedes, assorted sizes (gold)	82 50@85 00
	Store Prices.
Bar, Swedes, ord'y sizes, less 5 ₱ ct.	— —@140 —
Bar, Refined " "	95 —@100 —
Bar, Common " "	87 50@ 90 —
Scroll " "	120 —@130 —
Ovals and half-round " "	120 —@145 —
Band " "	120 —@ — —
Horse Shoe " "	120 —@ — —
Rods, ⅜ to 5-16 inch " "	100 —@155 —
Hoop " "	125 —@180 —
Nail rod, less 5 ₱ ct.	8½@— 9½
Sheet, Russia, as to Nos. (gold)	— 10¾@—11½
Sheet, Single, D. and T. Common	— 5¼@— 7
Sheet, Galvanized	List 15@25 ₱ cent. discount.
Rails, English (gold), ₱ ton	56 50 @57 00
Rails, American, at Works in Pa	76 00 @77 00

STEEL.—Duty: Bars and Ingots, valued at 7 cents ₱ lb or under, 2½ cents; over 7 cents and not above 11, 3 cents ₱ lb; over 11 cents, 2½ cents ₱ lb, and 10 ₱ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ₱ lb	— 18 @— 22
English Spring (2d and 1st quality)	— 9 @— 11½
English Blister (2d and 1st quality)	— 11½@— 19
English Machinery	— 12½@— 15
English German (2d and 1st quality)	— 14 @— 16
American Blister "Black Diamond"	— 10½@— 16
American, Cast, Tool do.	— 19 @— —
American, Spring, do.	— 10 @— 13
American Machinery, do.	— 10 @— 13
American German, do.	— 10 @— 13

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper cents ₱ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₱ lb	— @— 32
Copper Bolts	— @— 33
Copper Braziers, 16oz. and over	33 @— 35
Copper Nails	38 @— 40
Copper, Old Sheathing, &c., clean	20 @— 21
Copper, Chili Pig	— @— —
Copper, American Ingot	22 @— 22½
Yellow Metal, New Sheating	— @— 27
Yellow Metal Bolts	— @— 27
Yellow Metal Nails	— @— 27

LEAD.—Duty: Pig, $2 ₱ 100 lbs.; old Lead, 1½ cents ₱ lb; Pipe and Sheet, 2¼ cents ₱ lb.

Galena, ₱ 100 lbs	$— — @— —
Spanish (gold)	6 30 @6 40
German, do.	6 30 @6 55
English, do.	6 30 @6 87½
Bar (net)	8 50 @— —
Pipe and Sheet (net)	8 50 @— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ₱ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₱ cent. ad val.

	Gold ₱ lb.
Banca	35¼@36
Straits	33¼@33½
English	31¼@31½

PLATES.

	Fair to Good Brands. Gold.	Currency.
I. C. Charcoal, ₱ box	$8 12½@8 37½	$11 00 @11 50
I. C. Coke	6 75 @7 37½	9 00 @10 25
Coke Terne	— — @6 00	— — @ 8 50
Charcoal Terne	7 75 @8 25	10 50 @11 25

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ₱ 100 lb.

	Gold.
Plates, Foreign, ₱ 100 lbs.	$6 — @6 12½
Plates, Domestic, ₱ lb.	— 9 @— 12

REMARKS.

IRON.—There has been a little more inquiry for Scotch Pig, but the market is as yet only moderately active. Dealers continue to purchase only as their immediate wants compel, and prices still have a softening tendency; the sales are 350 tons Eglinton, part at $34.50; 200 do. Glengarnock, 150 do. Summerlee, and 150 do. Gartsherrie, on private terms. American meets with very little inquiry, and prices are nominally as before noted, viz., $39 @ $40 for No. 1, and $37 @ $38 for No. 2. Wrought Scrap is in moderate request at steady prices; 200

tons sold on terms we did not learn. There is very little inquiry for new Rails, and prices are unchanged; there is an improved demand for old, and we notice sales of 4,000 tons Double Headed, to arrive, on private terms.

COPPER.—Ingot remains very quiet; speculators are out of the market, and manufacturers are not disposed to anticipate their wants in the present unsettled state of things. The business has been confined to 150,000 lb. Lake Superior at 22 @ 22½ cents, mostly 22, cash.

TIN.—The demand for Pig is still very limited, and we have only to note the sale of 50 slabs Malacca at 33½ cents, gold, and 100 do. at a private price; English may be quoted nominally 31¼ @ 31½ cents, and Banca 35 @ 35½ cents, gold. The market for Plates is flat, and in the absence of all movement our quotations remain entirely nominal.

LEAD.—The market for Pig is dull and drooping. We have only to notice the sale of 50 tons Spanish, ex ship, at $6.30, gold.

SPELTER—Is dull and unsettled; 50 tons Silesian sold at 6 cents, gold.

ZINC.—American, dry, 8½c.; French, dry, 11½c.; French, metallic, 12½c.

MANGANESE—5½c. per lb.

Mining Stocks.

NEW YORK, Dec. 2, 1869.

The improvement noticed last week in Mining stocks has continued up to the present time. Colorados are very active at rates still further advanced. Heavy sales of Grass Valley are reported at 46c. @ 47c.; Hope, 10c. @ 11c.; LaCrosse, 22c. @ 24c.; Smith & Parmalee, $1 80 @ $1 90, and Quartz Hill, $2 45 @ $2 50. Prices in some instances have advanced from 50 to 100 per cent. since our last writing.

Reynolds & Nye are once more on the market at 1c. @ 2c.

Petroleum stocks also, in some instances, show advances.

	Bid.	*Asked.*
Bennehoff	30	—
Clinton Oil	—	—
Brevoort	—	—
Buchanan Farm	40	43
Home Petroleum	6 00	8 00
Central	70	71
New York and Alleghany	1 30	2 00
National	1 00	—
United States	80	—
Northern Light	60	1 00
United Petroleum Farms	20	—
Rynd Farm	18	—
Pithole Creek	1 70	2 00
Bergen Coal and Oil	35	—
Second National	—	—
Rathbone Oil	20	—
Union	—	—

San Francisco Stock Market.

SAN FRANCISCO, December 7, 1869.

	1st Board.	2d Board.
Savage	58½	59½
Crown Point	13½	13⅝
Yellow Jacket	46⅜	45⅝
Kentucky	1 58	1 59½
Chollar Potosi	22¾	—
Gould & Curry	76	77
Ophir	17	16¾
Alpha	20	—
Belcher	16	15½
Imperial	No sales.	
Hale & Norcross	1 75	1 75

(By Mail.)

SAN FRANCISCO, Nov. 18, 1867.

WASHOE.	*Bid.*	*Asked.*
Alpha Consolidated	20	20⅛
Belcher	15⅛	15⅝
Crown Point	15¼	15⅞
Confidence	30	35
Chollar-Potosi	22⅛	22
Daney	1	1½
Empire	60	—
Exchequer	11	11¼
Gould & Curry	80	81
WHITE PINE.		
Aurora Consolidated	17 00	18 00
Brodt	30	35c.
Chloride Consolidated	1¼	1½
Mammoth	75	90
Noonday	90	1
Original Hidden Treasure	10¾	11
CALIFORNIA.		
Amador	285 00	300 00
Eureka	240 00	260 00
IDAHO.		
Golden Char't.	19 00	20 00

Assay Office Report for November.

Statement of business at the United States Assay Office, at New York, for the month ending November 30, 1869:

Deposits of Gold		$575,000 00
Foreign coins	$6,000 00	
Foreign bullion	12,000 00	
United States bullion	557,000 00	
Deposits of Silver, including purchases		137,000 00
Foreign coins	68,000 00	
Foreign bullion	13,000 00	
U. S. bullion (contained in gold)	8,000 00	
" Colorado	9,000 00	
" Lake Superior	3,000 00	
" Nevada	36,000 00	
Total deposits, payable in bars	452,000 00	
" " " coins	260,000 00	
Total deposits		$712,000 00
Gold bars stamped		$1,313,758 04
Silver bars stamped		$128,369 83
Transmitted to the U. S. Mint, Phil'a., for coinage		$155,863 45

The New Tunnel in Chicago.

A SECOND tunnel is to be built under the Chicago River at Chicago, for the purpose of connecting the two divisions of the city. The work has already began. The Chicago *Tribune* gives a detailed description of the proposed tunnel, from which we take the following facts and figure:

"The tunnel is to be placed with its centre line in the centre of La Salle street. The southern approach is to begin forty feet north of the north line of Randolph street, and the northern approach to terminate at the south line of Michigan street. The bottom of the tunnel, or top of invert in the centre of the river is to be thirty five feet below low water. The grades between the ends of the approaches and the centre of the river to be uniform, except on the river portion of the work, where it will be less than on the approaches. The tunnel under the river is to consist of three passageways. The east one for foot passengers, and the other two for horses and vehicles drawn by horses. The east passageway is to be twelve feet high between the bottom of the upper arch and the top of the invert. The width of this passageway is to be ten feet. The other passageways are to be eleven feet wide, their inverts to be segments, the upper arches to be struck from three centres; a flagging course of ten inches thick is to be laid entirely across from one side to the other of the tunnel. The section of the tunnel above described is to extend entirely across the river, a distance of 300 feet. The flagging course over the top of the tunnel will extend for a distance of 280 feet only, including two and a half feet to be built under each dock wall. Beginning at a point 150 feet each way from the centre line of the river, the section of the tunnel changes to a single opening or passageway, beginning here with a width of twenty-four feet, four inches, and diminishing to a width of nineteen feet six inches in a distance of forty feet, or to points 190 feet on each side from the centre line of the river. At the points 150 feet each way from the centre line of the river, the centre of the single passageway begins with a height between the top of the invert and the bottom of the top arch of twenty-one feet.

"The open approaches to the tunnel on each side, and the passageway for horses, are to be paved with wooden block pavement (the whole distance being 1,890 lineal feet,) resting on lake shore sand, in the manner shown on plans and according to the usual specifications of the Board of Public Works for such pavements.

"The contract requires that the river shall be entirely free and unobstructed, as also North and South Water streets, by the first day of April, 1871, and the tunnel to be complete and ready for public use by the first day of July, 1871. This is about the same length of time employed in the construction of the Washington street tunnel. The total cost of the La Salle street tunnel is expected to be upwards of $475,000."

American Steel Rail Works.

FOUR large steel works for making rails have already been established in this country, and a fifth is nearly completed. JOHN A. GRISWOLD & Co., proprietors of the Bessemer Steel Works, of Troy, N. Y., made about 2,000 tons of steel rails, half of them for the Erie Railroad, prior to the burning of their works, in October, 1868. None of these rails have broken, and official certificates testify that they are equal to the best foreign rails. The new works, now nearly completed, will enable the proprietors to produce steel rails at the rate of 15,000 to 20,000 tons per year.

The Pennsylvania Steel Works, at Harrisburgh, are now, and have been for some time, producing steel rails at the rate of 12,000 tons annually. They are mostly laid on the Pennsylvania Railroad, and the official reports show them to be equal to the best foreign rails. The yearly capacity of the works is 20,000 tons.

The Cleveland Rolling Mill Company are producing steel rails at the rate of 6,000 to 8,000 tons per year. They have only recently started, and are not yet in full operation. Their capacity is from 15,000 to 20,000 tons per year. Their steel is of Lake Superior iron, and is of excellent quality.

The Freedem Iron and Steel Works, at Lewistown, Pa., are producing rails for the Pennsylvania and other roads at the rate of some 8,000 tons per year. Their annual capacity is 10,000 to 12,000 tons. Their steel is pronounced by the Pennsylvania Railroad Company, after rigid tests, equal to the foreign.

The Cambria Iron Company have a Bessemer Steel Works nearly completed, at Johnstown, Pa. Its capacity will be 20,000 tons. The above statements indicate that we shall be able by the coming year, to produce annually at least 80,000 tons of good American-made steel rails, a fact full of promise for the future of American railways.

The Speed of the Tongue

Is a subject for very curious statistical computation. An English sage says that each person on an average talks during three hours in the twenty-four at the rate of 100 words per minute, or 29 octavo pages per hour, which would make 600 pages per week, or 59 good stout volumes per annum.

MINING COMPANIES AND STOCK QUOTATIONS.

GOLD AND SILVER COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
Alameda Silver		A. Queran, 108 Wall st	$2,000,000	$10 00		
Ada Elmore	South Boise, Idaho					
American Flag	Nevada District, Col	P. P. Fullerton, 71 B'way	600,000	10 00		
Atlantic and Pacific	Humboldt Co., Nevada					
Bates and Baxter	Colorado			50 00		
Benton	Colorado	W. F. Drake, 15 Broad	500,000	5 00	15	18
Briggs	Colorado	J. P. Davies, 19 Cliff	1,000,000	100 00		
Black Hawk	Colorado	C.T.Whittington, 48 Broad	2,500,000	100 00	25	50
Bobtail	Colorado	J. Stanton, Jr., 25 Nassau	1,000,000			
Bullion Consolid'ed Gold	Colorado					
Burroughs Gold	Colorado					
Church Union Gold	California					
Consolidated Gregory	Colorado				1 45	1 50
Combination Silver	Nevada			100 00		
Columbia Silver	Austin, Nevada	J. M. Brown, 155 B'way	5,000,000			
Commercial Silver		J. E. Smith, 26 Pine	3,000,000			
Corydon	Gilpin Co., Colorado	J. Samuels, 40 B'way	500,000			
Downieville	Colorado		2,500,000	25 00		
Eagle Gold	Gold Dirt Dist., Col	J. P. Davies, 19 Cliff	300,000	1 00		
Empire Gold and Silver	BodieBluff,MonoCo.Cal	H. K. Gates, 70 B'way	1,000,000			
Edgehill		A. Fullerton, 71 B'way	10,000,000			
Esperanza Silver		Ezra Clark, Jr., 13 William	400,000			
Fisk Gold		H. Johnson, 195 Fulton	500,000			
Forest Queen		E. B. Beet, 62 B'way	1,000,000			
Golconda Gold	Sherbrooke, C. E.	H. Adams, 71 Broadway	2,000,000			
Gregory	Colorado		1,250,000			
Gunnell Gold	Colorado	J. H. Rolston, 80 B'way	1,000,000	50 00		
Gunnell Central	Colorado	C. B. Bostwick, 16 B'way	3,000,000	10 00		
Gold Rock		R. M. Lockwood, 93 Wall	400,000			
Grass Valley					46	47
International Silver		J. W. Brazier, 26 Pine	600,000			
Hope Gold	Colorado		5,000,000		10	11
Holman			2,000,000	25 00		
Kipp & Buell	Colorado		300,000			
Knickerbocker Gold		J. H. Rolston, 80 B'way	200,000	100 00		
La Crosse Gold	Nevada Dist., Col	P. P. Fullerton, 71 B'way	1,000,000		22	24
Lander Hill T. & S	Nevada	M.L.Catherwood,74 B'way	1,000,000			
Lewis Gold	Georgia		1,000,000			
Liberty Gold					6	7
Manhattan Silver	Nevada	M. L. Ogden	400,000			
Maraposa common	California	Jas. H. Ferdon, 34 Wall	12,000,000		7⅜	8
Mariposa preferred	California	do. do.			15⅜	15¼
Montana Gold		G. De Cordova	400,000		7	25
Montana M. L. & M. Co.	Montana	A. M. Hoyt, 22 William	250,000			
Montrose	Clear Creek Co., Cal	W. W. Perkins, 71 B'way	1,000,000			
New York Silver	Nevada	Thos. Sproull, 78 B'way	1,500,000			
New York and Austin	Nevada	E. R. Siccomb, 70 Wall	500,000			
New York and Owyhee	Owyhee Co., Idaho		1,000,000			
New York and Eldorado		G. H. Munroe, 10 Wall	2,000,000			
N. Y. & Montana M. & D.	Montana	F. A. Chapman, 20 Nassau	1,250,000			
N. Y. & Silver Peach	Nevada	R. C. Root, 74 B'way	2,000,000			
N. Y. & Utah P. & M		W. H. Mailler, 108 Wall				
Ophir Gold	Comstock Lode, Nev.	L. C. Warner, 70 B'way	625,000			
Owyhee Gold		W. H. Smith, 43 Ex. Place	1,700,000			
Pahranagat Central	Nevada	J. E. Smith, 25 Pine	6,000,000			
Quartz Hill Gold		F. Bernard	2,500,000		2 45	2 50
Reese River Consol'd	Nevada	W. B. Ogden	6,000,000			
Rocky Mountain	Colorado	S. M. Pond, 70 B'way	500,000	10 00		
Rollins Gold		Thos. Bond, 132 B'way	600,000			
Sensenderfer	Colorado	H. A. Shewill, 19 Broad	1,000,000			
Silver Bend		F. W. Macy, 20 Nassau	1,500,000			
Silver Mt. Silver		H. A. Moen, 71 B'way	1,000,000			
Silver Peak & R. M.	Nevada	W. B. Ogden, 52 Wall	5,000,000			
Smith & Parmelee	Colorado	W. H. Hollister, 6 Broad	2,500,000	20 00	1 80	1 90
Social & Steptoe Con.		T. H. O'Connor, 24 Nassau	450,000			
Standard Gold		C. B. Bostwick, 169 B'way	500,000			
Symonds Forks						
Twin River Silver	Nevada	J. F. R. Hadden, 20 Nassau	800,000	100 00		
Texas Gold	Colorado		500,000	10 00		
Union Gold	Colorado	F. A. Potts, 110 B'way	1,200,000			
Wash. Mill & Silver	Nevada	W. W. Perkins, 71 B'way	300,000			
Wauba Yuma	Arizona	J. W. Silsby, 36 Pine	6,000,000			

COAL AND IRON COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
American Coal Co		M. A. Myers, 119 B'way	$1,500,000	$25 00		
Ashburton Coal Co		J. T. Rollins, 41 Pine	2,500,000			
Block House Coal		D. B. Keeler, Jr., 43 Pine	1,000,000			
Brewster Iron		H. Robison, 165 B'way	150,000			
Broad Top Coal & Iron Co	Pennsylvania	B. Love	2,000,000			
Cameron Coal Co		J. A. Simpson, 40 B'way	2,500,000			
Carbon Hill Coal Co		J. Silsby, 36 Pine	1,000,000			
Central Coal		F. P. White, 111 B'way	2,000,000	100 00		
Clifton Iron Co		P. H. Riordan, 34 Pine	1,250,000			
Columbia Iron		E. D. Webb, 77 Cedar	1,000,000			
Consolidation Coal	Maryland	J. S. Mackie, 71 B'way	5,000,000			
Crawford Coal		E. Clapp, Prest, 137 B'way	1,000,000			
Cumberland C. & I. Co		E. Kiscan, 90 B'way	5,000,000		25½	
Derby Coal Co		W. S. Davison, 71 Broad				
Dover Coal and Iron Co		L. Chase, 88 Wall				
Del. & Hudson Canal Co			10,000,000	100 00		
Ebervale Coal		G.L.Stout, Treas.,111 Br'y	500,000			
Fall River Bituminous		D. T. Blauvelt, 43 Pine	1,000,000			
Farrar Coal		C. H. Jones, 43 Pine	250,000			
Fisher Iron Co		M. Ellis, 19 William	100,000			
Hamp're & Balt. Coal		S. M. Pond, 70 B'way	500,000			
Iron Cliffs Co		C. J. Canda, 52 Wall	1,000,000			
Jackson Iron		G. P. Loyd, 119 B'way	300,000			
Kemble Coal & I. Co		R. A. Wight, 26 Ex. Place	300,000			
Keokuk Coal		J. F. Franklin, 112 B'way	100,000			
Lackawanna I. & C	Pennsylvania	E. C. Lynde, 52 Wall	1,200,000			
Lewis Run C. & I. Co		C. A. Sanborn, 80 B'way	750,000			
Lykens Val. Coal Co		F. A. Platt, 13 William	800,000			
McKean Co. Bit. Coal Co.		J. H. Rolston, 80 B'way	1,500,000			
Lehigh & Susquehanna						
Mahanoy			400,000	100 00		
McNeal C. & I. Co		C. C. Godwin, 71 B'way	500,000			
Mount Riga Iron		G. M. Newton, 42 Cedar	300,000			
New Boston Coal		C. H. Ogden, 55 B'way	2,000,000			
N. Y. Con. C. & I. Co		A. T. Levine, 16 Wall				
N. Y. & Lehigh Coal		T. Simpson, 111 B'way	150,000			
Pacific Coal Co		G. Wrighton, 34 Wall				
Peekskill Iron Co		W. Murdock, 7 Nassau				
Pennsylvania Coal Co		C. H. Mead, 111 B'way	3,200,000	50 00		
Richmond Iron Co		C. H. Smith, 165 B'way	1,000,000			
Scotia Coal Co		I. N. Soper, 42 B'way	2,500,000			
Spring Mt. Coal		C. Runyon, 111 B'way	1,250,000			
Springfield & D'p Run C.		E. D. Webb, 77 Cedar	600,000			
Stout Coal Co		G. S. Comstock, 111 B'way	500,000			
Susquehanna & Wyoming		E. Potter, 40 B'way	1,000,000			
Tannerdale Coal		I. T. Ludlaw, 71 B'way	250,000			
Wash. Mutual Coal		M. C. Baker, 117 B'way	420,000			
West Point Iron Co		R. C. Brock, 110 B'way	500,000			
Wilkesbarre C. & I. Co		W. H. Tillinghast, 80 Br'y	3,400,000			
Wyoming Val. Coal Co		E. Potter, 40 B'way	1,000,000			

COPPER AND LEAD COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
Anita Copper	California	J. A. Ferguson, 8 Wall				
Corinth Copper	Corinth, Vermont	S. H. Howard, 191 B'way	$500,000	25 00		
Davidson Copper						
Eagle Harbor Copper	Michigan	W. H. Smith, 43 Ex. Place	500,000	25 00		
Evergreen Bluff Copper	Michigan	F. W. Caper, 44 Ex. Place	500,000	25 00		
Globe Copper		R. K. Rickard, 19 Nassau	200,000			
Grand Portage Copper Co		A. S. Kellogg, 22 Pine	500,000			
Guymard Lead		Samuel Vernor, 38 Pine				
Hilton Copper		W. H. Smith, 43 Ex. Place	500,000			
Hope Copper		J. W. Davis, 19 Nassau	500,000			
Hudson River Copper	New York	T. Clarkson, 22 William	1,500,000			
Indiana Copper Co		J. M. Mills, 25 Nassau	500,000			
Isle Royale Copper	Michigan	F. W. Caper, 44 Ex. Place	1,000,000			
Keweenaw Copper	Michigan	F. W. Caper, 44 Ex. Place	500,000			
Lake Superi'r Silver Lead	Michigan	A. S. Kellogg, 22 Pine	1,000,000			
Omiga Copper	Michigan	S. Cooper, 7 Pine	500,000			
Ridge Copper	Michigan	J. L. Gardiner, Jr., 43 Ex. P.	500,000			
Rockland Copper	Michigan	A. Fullerton, 71 B'way	500,000			
St. Joseph Lead	Michigan	J. W. Jones, 6 Broad st	1,000,000			
St. Marguret Copper		E. P. Sutton, 43 Pine	250,000			
Schoolcraft Copper		R. Walsh, 22 William	500,000			
Superior Copper	Michigan	A. Fullerton, 71 B'way	500,000			
Union Copper		A. S. Kellogg, 22 Pine	500,000			
Vermont Copper	Vermont	J. C. Fly, 191 B'way	500,000			
Wallkill Lead		S. M. Pond, 70 B'way				

MISCELLANEOUS.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
American Zinc Co		W. E. Lawton, 19 Cliff	$1,000,000			
Bigelow Blue Stone Co		H. Bogardus, 14 Pine				
Quicksilver					12¾	12⅞
Covill B. L. M. & M'f. Co		C. R. Bostwick, 302 Pearl	250,000			
Manhattan Marble		H. K. Gates, 70 B'way	300,000			
N. Jersey Zinc Co	New Jersey	A. H. Farlin, 61 Maiden L'e	1,500,000			

The Blow-pipe Assay.

BY PROF. A. B. PRESCOTT, OF THE UNIVERSITY OF MICHIGAN.

I.

QUANTITATIVE analysis by the blow-pipe is restricted to the determination of certain metals. It is employed chiefly for gold and silver; also to some extent for copper, and for lead; and it has been used for tin. When both gold and silver are present, their sum may be determined by the blow-pipe; but no dry method is known for the separation of silver from gold. The "parting" of these metals by wet analysis is usually included in the subject of blow-pipe assaying.

The *qualitative* determination of minerals or products—by use of the blow-pipe, if necessary—should precede the blow-pipe assay. But when the operator has ascertained the constitution of the gangue and mineralizers, he may, if he chooses, proceed at once by blow-pipe assay to determine both the presence and amount of precious metal.

The peculiar value of "blow-pipe assaying" lies in the fact that it can be used in the field. Unportable apparatus should not be introduced in the acquisition of this art. For ordinary laboratory employment, however, it is a most convenient and satisfactory method in determination of silver and gold. Performed by the expert, its results are accurate. It is a quick method. It trains the operator in nicety and skill of perfection and execution. It should be cultivated, both as an indispensable addition to the resources of the explorer, and as a fine chemical art.

Outline of the Dry Method for Silver and Gold.—In the elimination of silver or gold by the dry way—whether it be in blow-pipe assay, crucible assay, or metallurgic operation—the processes consist of two distinct operations: 1. The production of the precious metal in alloy with lead; 2. The removal of the lead, and any base metal present, by oxidation. In both operations the material is liquid, by fusion. The uses of the lead are two-fold; in the first operation the lead, diffused through the liquid mass, gathers all the precious metal into one body of alloy, free from earths; in the second operation, the easily-oxidizable lead enables such difficultly-oxidizable metals as copper and nickel, in alloy therewith, to be oxidized also.

Two parallel assays should be made upon the same quantities. If the two results are sufficiently near each other, the mean is taken; if not, the work is repeated. It requires less time to conduct these two assays step by step together.

SILVER.

1. ARGENTIFEROUS ALLOYS; 2. ARGENTIFEROUS MINERAL ORES AND PRODUCTS.

I.—ARGENTIFEROUS ALLOYS.

Weighing.—If the alloy has over 50 per cent. silver, accurately weigh about 0.050 grammes. It is difficult to take precisely a specified weight of alloy, and the only object in so doing would be simplicity in calculation of the result. If the alloy contains less than 50 per cent. of silver, accurately weigh 0,080 to 0.100. The weighed portion is now termed "the assay."

ALLOYING WITH LEAD.

Proof-Lead.—Reagent is required to be free from silver, and for most purposes, to be finely divided. Make a saturated and clear solution of acetate of lead, found free from silver. Suspend therein clean plates of zinc, occasionally scraping off the lead, until it is no longer deposited upon the plates. Drain the precipitated lead, in an atmosphere from hydrosulphuric acid or oxidating vapors. Dry it in vacuum; or between folds of bibulous paper, in sulphuric acid desiccator. It is easily oxidized, and should be kept in close stoppered bottles. If it contain silver, it can only be used by making each time a parallel assay of a precisely equal quantity of proof-lead, and deducting its result from that of the argentiferous assay.

From 16 to 60 parts of proof lead are required to remove one part of copper or nickel from the silver assay. When the proportion of silver is large, more lead is required to remove a given amount of copper or nickel, because the silver protects the copper from oxidation. At least 1 part of lead is always required for 1 part of assay; for if pure silver, so much lead is needed to make the assay fusible enough for cupellation. The table gives the maximum of lead for the silver assay, and sufficient for gold assay:

Amt. copper (or nickel) in 1 pt of assay...	1.02	0.05	0.10	0.20	0.30	0.40	0.50	0.80	1.00	0.
Amt. lead req'd for 1 pt. of as.	1.	2.	3.	6.	9.	12.	15.	20.	20.	1.
Amt. lead to 1 part of cop...	50	40	30	30	30	30	30	25	20	

A solid cupel is now to be made of *sieved bone-ash*, in the *cupel-mould*, dried before the blow-pipe, and levelled again with the bolt.

Bone-ash is required of two degrees of fineness: "sieved bone-ash," and "elutriated bone-ash." Bone is burned until *entirely* white. (No carbon is admissible in the cupel, for obvious reasons.) Chicken bone, and bones which have been long boiled in pure water, burn quickest. The decarbonized bone-earth is pounded in a *clean* iron mortar, and sifted through a sieve of about forty meshes to the linear inch—for "sieved bone-ash." Pulverized bone-earth is turned into a deep dish of pure water, agitated, allowed to subside for about one-fourth of a minute, and then decanted, leaving all residue. Other portions of bone-earth are treated in the same manner—until the decanted water contains sufficient elutriated ash. The residue of decantation may be re-pulverized and elutriated. The elutriated ash is most easily gathered by twenty-four hours' subsidence—is then drained on a filter and dried—and is termed "Elutriated Bone-ash."

Cupel moulds are generally made of iron. They should be supported on a stem non-conducting caloric. The mould is filled with bone-ash, and packed *firmly* with the iron bolt, and by light blows of the hammer. The convex face of the bolt should be polished, that it may leave no film of iron oxide. Clay smoking pipes have been used for cupel moulds. Those with small bowls, as nearly circular as possible, are selected, and the bowl cut off half way to the base. Clay dissipates less heat than iron; but a firm, careful hand is required in packing and finishing a solid cupel in a clay bowl.

Some proof lead is mixed with borax, placed in a charcoal cavity, fused in reducing flame to one globule, detached, and hammered on the anvil, to a leaf.

The Anvil is a little parallelopiped of hard steel, with *polished* face. The Hammer must also have a smooth and polished face; and neither should be used for ordinary purposes. They are required to flatten the gobules of the finished assay.

The leaf of proof lead, trimmed by the scissors to the requisite weight, as indicated by the table, is now placed a little to one side of the centre of the cupel, the assay placed upon it, and a very gentle blow-pipe flame directed upon the assay, till it is alloyed with the lead to a globule (or the weighed or measured proof lead, the assay, and borax, are together placed in a soda-paper cornet—to be described—and fused to a globule in a charcoal cavity.)

Oxidation.—A strong and thoroughly oxidizing blow-pipe flame is directed upon the sides of the cupel, till the mould and adjacent bone-ash are hot. The heat is approached to the assay until it fuses. The lead now rapidly oxidizes; the litharge flows off the globule and settles around it. Throughout this process, it is the operator's object to oxidate the globule as slowly as possible, and still keep it fully fused, and at the same time to keep the litharge and subjacent bone-ash as hot as possible without overheating the globule. To this end, the cupel is slightly inclined (on an axis in line with the flame) so that the globule, as it rotates, is kept upon one *border* of the spot of produced litharge and next to clean bone-ash, upon which it steadily and slowly progresses, (in a direction of right-angles to the direction of the flame) and leaving behind it a track of litharge under the full force of the blow-pipe flame. If care is not taken in poor assays, the globule becomes swamped in an indistinguishable mass of rapidly-produced litharge. This failure is avoided by keeping the globule as cool as possible with fusion, and keeping the bone-ash and litharge as hot as compatible with that careful heating of the globule. If the globule ceases to rotate, the flame should be increased upon it. If a crust of (copper) oxide forms upon the globule, the blow-pipe is pushed farther in the flame, making a fine-pointed flame, which is carried directly upon the globule. If necessary for its fusion, the globule may be briefly approached to the reducing flame. In this "oxidation," or "concentration of the silver-lead," the sieved bone-ash acts as a coarse filter admitting the litharge. It is a brief process, which should be continuous, and should cease when the globule contains about twenty per cent. of lead. At this point the globule has ceased to rotate, looks bright in the flame, is not seen to cast off litharge, yet will still very quickly stain fresh bone-ash under flame. The cupel is very gradually receded from the flame, to cool the globule slowly. When cool, the globule, with adhering crust of litharge and bone-ash, is carefully lifted from the cupel, laid on the anvil, (over a sheet of glazed paper) and, by very light blows, it is detached and flattened. If the globule be less than about 0.001, it should be set aside, and one or more assays weighed, alloyed with lead and oxidated, until the combined weight of the oxidated globules shall equal 0.002 or more. The oxidated globules are all now placed together on one of the oxidation cupels, fused to one, and then cupelled as next directed.

Cupellation.—The remaining surface of the oxidation cupel is removed; it is filled up with elutriated bone-ash, solidified, dried in the flame, and made smooth. The remainder of lead in the assay is removed upon this—the close filter of bone-ash. The flattened globule is placed near the border of the cupel, the circumference of which is now heated by the blow-pipe flame, made very gentle, lest the globule be blown away. The strictly oxidating flame is advanced gradually to the globule. Soon after its fusion, if its oxidation was not pushed too far, it securely adheres to the cupel. The globule must be kept fused; but this should be done by heat reflected from the bone-ash around it, and conducted from the bone-ash beneath it, and, so far as possible, without direct application of the flame to the globule; however, it should be kept fused. If much litharge is given off, the globule is kept at the border of the litharge spot, and allowed to move to fresh bone-ash, by inclination of the cupel, as in oxidation; but this process must be so managed that *all* the litharge be absorbed by the bone-ash or dissipated. The cupel surface will be stained, but must be smooth and level. As the last portion of lead oxidizes into litharge, and spreads over the surface of the now pure molten silver, an iridescent play of colors suffuses the surface of the globule. Upon small globules iridescence may not be observable. After the iridescent litharge passes off, the still molten silver globule shines for a few seconds with an intensely brilliant white light, termed the "brightening;" and then, losing the mirror lustre, shines with silver white light. The globule is now turned, for some time, directly in the outer oxidizing flame, to dissipate and clean away all litharge at its base; and is then very gradually receded from the flame. If it be permitted to cool rapidly, it "spits" or "vegetates." This is stated to occur by the escape of oxygen, which the fused silver has absorbed. It is prevented by the presence of 1 or 2 per cent. of copper. The globule is now examined under the magnifier. It should be white, smooth, and spherical to the eye. If it appears flattened, it probably contains copper; a cupriferous globule "dilates" in cooling to a visibly flattened sphere. If the globule be imperfect, a somewhat larger globule of proof lead is placed against it, fused into it; and it is then recupelled, being drawn to a fresh portion of cupel surface. Re-cupellation may (rarely) be necessary to remove from the globule adherent particles of bone-ash. The cooled globule is carefully removed by clean and secure forceps, manipulating over glazed paper. A watch-glass, or a very small vial, is a convenient receptacle. It is weighed, or, if too small for weight, it is measured. If its weight be 0.001, or over, it should be determined by the balance. If under 0.001, its weight may be determined by HARKORT's measuring scale; but the most delicate balances will determine even 0.0001 more closely than can be done by measurement.

Calculation.—The weight of finished globule, divided by weight of assay (or sum of assays) is the proportion of silver in the substance assayed.

Cupellation-Loss of Silver.—The loss in oxidating and cupelling occurs by mechanical carrying of silver by the litharge. The amount of this loss increases with the amount of lead cupelled off. When the assay is poor in silver, the loss is a greater proportion of the weight of that silver, though less in proportion to the weight of the assay, than when the assay is rich in silver. Assays of the same weight, and of the same proportion of silver, cupelled with the same proportion of lead, *at the same temperature*, always sustain the same loss. The table gives the losses—with different per cents of silver and different amounts of lead—at the lowest working temperature, and hence indicates the least possible loss. Increase of temperature in working increases the loss in a marked degree.

TABLE OF CUPELLATION LOSS,

In percentage of silver in the Assay; this percentage to be added to that found by assaying.

The entire amount of lead in the assay (or assays) being the following multiples of the weight of the assay (or sum of assay).

Percentage of silver found by assaying.	1	2	3	4	5	7	8	11	13	16
99.5	0.25	0.32	0.39	0.45	0.50					
90	0.22	0.29	0.36	0.42	0.47	0.69	0.83			
80	0.20	0.26	0.33	0.39	0.44	0.64	0.75			
70	0.18	0.23	0.29	0.35	0.40	0.58	0.68	0.82		
60	0.16	0.20	0.26	0.30	0.36	0.52	0.61	0.74		
50	0.14	0.17	0.23	0.26	0.32	0.46	0.54	0.65		
40	0.12	0.15	0.20	0.22	0.27	0.39	0.46	0.55	0.62	
30	0.10	0.12	0.16	0.16	0.22	0.32	0.38	0.45	0.51	
25	0.09	0.10	0.14	0.14	0.20	0.29	0.34	0.40	0.45	
20	0.08	0.09	0.12	0.12	0.17	0.25	0.29	0.35	0.39	0.45
15	0.07	0.08	0.10	0.11	0.15	0.20	0.23	0.28	0.32	0.37
12	0.06	0.07	0.09	0.10	0.13	0.17	0.19	0.23	0.26	0.32
10	0.05	0.06	0.08	0.09	0.11	0.15	0.17	0.20	0.23	0.27
9	0.04	0.05	0.07	0.08	0.10	0.14	0.16	0.18	0.20	0.25
8	0.03	0.04	0.06	0.07	0.09	0.13	0.15	0.16	0.18	0.22
7	0.02	0.03	0.05	0.06	0.08	6.12	0.13	0.14	0.16	0.20
6	0.01	0.02	0.04	0.05	0.07	0.10	0.11	0.12	0.14	0.17
5		0.01	0.03	0.04	0.06	0.09	0.10	0.11	0.12	0.14
4			0.02	0.02	0.05	0.07	0.08	0.09	0.10	0.11
3			0.01	0.02	0.04	0.05	0.06	0.07	0.08	0.09
2				0.01	0.03	0.04	0.04	0.05	0.06	0.07
1					0.01	0.03	0.03	0.04	0.04	0.05

Alloys suitable for direct Cupellation.—Alloy of silver and bismuth may be treated like silver-lead, deducting its bismuth from the proof-lead to be added in the beginning, and at the close of the oxidation adding a little lead; oxidizing again, and then cupelling. Alloys containing iron, tin, zinc, antimony, arsenic, sulphur, or much mercury, must be scorified on charcoal, in the manner directed for "minerals," etc., containing the same elements.

The Coal-Mine Disaster in Wales.

THE English papers of the 17th ult., give the particulars of the recent fatal explosion in the Welsh collieries at Wigan, from which we extract the following:

"The explosion occurred shortly after four o'clock yesterday afternoon, and the first indications at the pit bank was a report as from a heavy piece of artillery, followed immediately by the issuing from the No. 5 shaft of a dense cloud of smoke and coal dust, which spread over the whole district. It is stated that some of the soot fell in Hindley church-yard, a mile and a half away, and the report was heard at quite as great a distance. The residents in the long rows of colliers' cottages near the pit, and the managers of the adjacent collieries, knew too well what had happened, and they hurriedly made their way to the colliery, the first to learn, if possible, the extent of the disaster, and the second, to render what assistance was in their power. The force of the blast was plainly apparent, from the manner in which the iron plate at the bottom of the cage was twisted and turned; and, as it was feared that very great damage had been done in the No. 5 shaft, it was first deemed advisable to rig up a pulley over the No. 6, which could be worked by the up-cast engines, and a stream of water was also sent into this shaft, to improve the ventilation. However, by disconnecting the cage from the conducting rods, it was found possible to proceed down the No. 5 in safety, and the new pulley was not needed for the purposes of exploration.

"The upper seams, the five and four feet, were soon examined, and tidings were sent to the surface that the explorers had been all around these workings and had found two dead bodies, both lying near the four-feet mouthing, and both having apparently been killed by concussion. It now became certain that the catastrophe had taken place in the six feet, wherein nearly thirty men and boys were employed, but as four o'clock was the hour for 'knocking off' work, and as several of the workmen had been wound to the surface, it was impossible to state positively how many were down. It was at first hoped that the total would not be over a dozen, but there is now no doubt the list of dead will be more than twice that number.

"The operations below were continued until about a quarter past eleven o'clock, at which time eight dead bodies had been sent up, and there were twenty searchers in the seam in which the disaster occurred. It was eventually decided that no further attempt to enter the workings should be made that night, and about one o'clock this morning the principal engineers left the colliery, after arranging for a consultation to take place this forenoon, and about that time also the crowd assembled near the colliery began to disperse, though many remained at their posts all night. The browman left on duty had strict orders to keep close watch on the body of smoke which ascended the shaft, but he perceived no change whatever either in quantity or smell. As the whole of the workings have not yet been examined, and in all probability the spot where the gas was ignited has not been reached, no opinion can be expressed as to the cause of the explosion. Those who believe the atmospheric pressure has much to do with these catastrophes point to the fact that the barometer was exceedingly low yesterday."

So far there have been nine miners drawn up, eight of them dead, and the ninth mortally injured but still breathing. There are eighteen still missing.

THE Eastport Salt Works are transforming into an iron smelting furnace, and will be operated by a New York company.

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor,

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The Suez Canal and the Red Sea.

THE stock of the Suez Canal Company, the par value of which is 500 francs per share, stood, some months ago, when the actual success of the engineering work was not yet assured, at 600 francs, but has fallen, since the completion of that work, to the neighborhood of 400 francs. This is one of those cases which forcibly illustrate how much fancy has to do with matters generally supposed to fall wholly within the prosaic realm of business. When there were two unknown elements in the calculation, to wit, the feasibility, and the subsequent profitable business, of the canal, capitalists were fired by the magnitude and romance of the conception to invest freely in the plan. Now that there is but one question unanswered, a chill of doubt seems to have succeeded to the fever of sanguine expectation; and, while the prospects of the Suez Canal are certainly better than ever, its value in the public estimation appears to have declined.

It is difficult to say which was unreasonable, the advance or the depression. If it is impossible to prove at present that the Canal will be immensely useful and profitable, it is equally impossible to prove the contrary. The question will perhaps not be immediately settled, since it involves a readjustment of the commerce of half the world. Some nations and ports must surrender their maritime pre-eminence; the work of VASCO DI GAMA must be undone, and the Mediterranean must again advance to its ancient importance as the highway to India. Even if there were no physical difficulties in the way, this revolution would naturally require time.

There is little doubt that, unless the charges of the Company for tolls are placed at a monstrously exorbitant figure, the route of the Canal will be chosen by steamers. But sailing vessels are governed by somewhat different considerations. Time is worth, in proportion, less to them, and money more. Besides, there is great doubt whether the trouble and delay encountered in the navigation of the Red Sea may not largely counterbalance the advantages of a short cut through the Isthmus. Nor is the longitudinal passage of the Mediterranean a pleasant trip for sailing vessels.

The fact that our information concerning the Red Sea is exceedingly meagre, is of itself an indication that its waters are not sought by mariners. One thing appears to be established by the reports of shipmasters, namely—that north winds are so prevalent as to render it very difficult to work a vessel up to Suez. Yet before the discovery of the Cape of Good Hope, in 1497, both the Turks and the Venetians covered the Red Sea with their East India traders; and in 1538 the Portuguese sent a fleet round the Cape to destroy these fleets. What was possible then, being necessary, may become possible again, being profitable. Mr. MITCHELL, from whose admirable paper on the Suez Canal we have freely quoted in a former article, remarks on this point: "I have no doubt that when the shores of this sea shall be properly lighted, its dangers marked by buoys and light-ships, and a better chart published, sailing vessels will find their way up by taking advantage of occasional slants of wind, and of the current which, upon the lull of the north wind, sets up steadily, although feebly. The channel is nearly everywhere over fifty miles wide, so that there is ample room for beating. The tidal currents do not seem to be either steady or strong, although there is a rise and fall of seven feet at Bab-el-Mandeb, and of five feet at Suez. In the central portion of this sea there appears to be as little tide as in the Mediterranean. The sky is clear nearly all the time, so that the latitude can be determined perhaps every day. The saving in distance between American ports and the East Indies by this new route is 3,200 miles at least, and over 4,000 miles upon the usual sailing courses. The saving in time for outward bound vessels will be in the same proportion; *but for homeward bound sailing ships the route through the Suez Canal will consume more time than that round the Cape.*"

This raises a most important question, which we have not space to discuss at present, but which may become the foremost element of the fate of the Canal. We refer to the possible gradual disappearance of sailing vessels from East Indian commerce, and the substitution of steamers, using this shorter route.

Stamp Mills in Colorado.

A RECENT editorial in this JOURNAL on the above subject has called forth some letters from parties interested. One correspondent, who is engaged in mining for gold in Colorado, communicates some interesting results, which we publish for preservation. He writes:

"Here is our trouble: under stamps we do not obtain enough of the contained metals to yield a profit adequate to the risks and outlay. Of ore delivered the smelter (Professor HILL), he wishes a very large part, it seems to me, for his services and charges, and even then there is not enough of this ore to raise the general average materially. For instance, in four consecutive weeks we mined and raised—

Tons.	Cost per ton.	Assay per ton.		Yield per ton.
87	$14.06	$25.83 gold, 3.90 silver	$29.73	$16.43
60	$17.35	$20.67 gold, 2.86 silver	$23.53	$10.29
77	$14.97	$23.77 gold, 2.99 silver	$26.76	$12.01
67	$14.41	Assay not received.		$11.77

"The assays are given in coin values, but the yield is currency. The figures in the column of cost include mining, stamping, and indeed all expenses, of which about ten per cent. were incurred in dead work (sinking shaft.)

"Five runs in August and September assayed—

Gold	$48.16	$23.35	$20.04	$24.80	$22.73
Silver	6.63	3.36	1.56	15.08	15.47
Total	$54.79	$26.71	$21.60	$39.88	$38.20
Yield in currency	$19.34	$13.36	$15.94	$8.63	$13.13

"In the four consecutive weeks first mentioned, we sold Professor HILL, at $100 currency per ton, 2.52-100 tons, costing $8.68 currency (no stamping, of course), and assaying gold, $149.33. There was not profit enough here to make up the loss in running the stamps. We expect subsequent weeks to show a greater production, at consequently a less average cost, but we must make money in a hard place, as well as in an easy one; and much more than ten per cent. of the expenses of a mine in Colorado ought to be expended in opening new ground. Moreover, we must bear in mind that a return of specie payments will take a considerable sum from our product. The yield in oz. gold of the above four weeks, the order being the same as before, was 544-1,000, 842-1,000, 527-1,000, 632-1,000 oz. gold. The work above alluded to, in August and September, included 283 tons crushed in August, and 316 tons in September. You will see that the third run assayed $21.60, and yielded $15.94. The agent explains this unusually large *pro rata* yield by saying that the batteries and table uncleaned for some weeks were cleaned up that particular week, and that the run of the next week was very poor."

Our correspondent requests advice; but this we cannot give him without more complete particulars. The facts he submits prove the existence of the evil, but they do not give any data for determining its cause, or deciding whether it is remediable. It is our impression that the amalgamation process, conducted with due care, should give better results than these; but we cannot pronounce even a qualified opinion without knowing the character of the ore, the details of the process, and the nature of the difficulty encountered in saving the gold. Have the tailings of the mill been saved and assayed? Is much quicksilver, as well as gold, lost in the mill? Are the sulphurets caught and concentrated? If so, with what success? and if not, why not? We are glad that mine-owners are aroused to the *facts* of loss; let them persevere in the attempt to discover its sources.

The Vertical Multiplier.

WE have received a long communication from Mr. FITHIAN, inventor of the above machine, to which allusion was recently made in our columns. Mr. FITHIAN adheres to his claim that one hundred pounds, descending one hundred feet at one end of his machine, will lift fifty pounds three hundred feet at the other end. We never intended to waste time in discussing this proposition, except so far as to show that it was "perpetual motion" in disguise. We must decline devoting further space to it; and as for Mr. FITHIAN, he can convince everybody by *doing* what he claims, and nobody by writing about it.

Gas Light in Mines.

THE English papers report experiments for the purpose of lighting mines with "a lamp of simple construction," burning a mixture of carburetted hydrogen and atmospheric air in such a way that an intense light is emitted, "accompanied by no visible flame." The rather obscure description published reminds us of nothing different from the calcium light, which has been tried in mines, without favorable, practical, or economical results.

Arkansas Ores.

IN connection with the interesting paper of Professor ROESSLER, published last week, on the geology of Arkansas, some of our readers may be pleased to learn that E. H. CHAMBERLAIN, 19 Broad street, Room 53, has a collection of ores from the Kellogg mines, in that State, including handsome specimens of argentiferous galena and zinc-blende, and rich argentiferous gray copper (fahlerz), which he will be happy to show to visitors.

Bridge Testing with a Vengeance.

UNDER this heading London *Engineering* neatly ridicules the statement of a *Times* correspondent, who was so unfortunate as to say, anent the failure of the piers of the Farringdon street bridge, that "in order to test their endurance to the utmost, *a commission of three eminent engineers is to sit upon them.*"

Petrifactions.

A COMMUNICATION FROM PROF. A. R. ROESSLER TO THE NEW YORK LIBERAL CLUB.

WHILE the excitement concerning the "fossil giant" is on the tapis a few remarks on the subject of petrifaction may not be inappropria te.

Petrifactions consist in the substitution of mineral or earthy matter for another substance. The shells of mollusks, the stems of branches of corallines, the bones of the mammalia, may all undergo the process of petrifaction, the kind of mineral or earthy matter into which they are converted depending upon what is in solution in the water where they happen to die. Shells are converted into silex or even into sulphuret of iron. Bones may become thoroughly silicified. Every particle of the original mass may not be removed in all cases, but by infiltration it is for the most part completely altered and turned into stone. The soft parts of animals, even when they die, and become covered up with mud or silt, are almost never preserved. At the moment of the cessation of vital functions, chemical decomposition commences, and they are converted into carbonic acid, water, ammoniacal and sulphuretted gases, which escape into the atmosphere. Petrifactions of fossils, therefore, merely represent the harder parts, the skeletons or the shelly covering of animals. When animals are buried in a moist place, they sometimes have their fatty portions changed into *adipocere*, a soft material, with the appearance of lard or cheese. The muscles, even under these circumstances, decompose and pass off in gaseous form.

The human skeletons of Guadaloupe, petrified in a recent limestone now in process of formatioon, although buried under water, have not the slightest trace of animal matter. It is essential to complete petrifaction of the hard parts of animals, that they be preserved under water, as in peat bogs or in similar conditions. In the air, or in dry places, not only will decomposition in a few years dispose of the fleshy parts of animals, but the hardest bones are found to crumble at a touch into dust. This has often been seen in opening Indian mounds. There is scarcely an instance on record of the soft parts of any animal, whether terrrestrial, fresh-water, or marine, being preserved, and, unless they were composed of earthy particles to a large extent it is not reasonable to expect that any such will ever be discovered.

A dead animal immersed in mud or sand and water has its soft parts slowly dissolved and washed away, and the harder parts, as bones, shells, etc., are chemically acted on by the water, which dissolves their earthy parts and replaces them particle by particle with others. Under such conditions, the changes are much slower than in the air, since the temperature is lower and more uniform. and the energetic power of oxygen from the atmosphere does not have access.

Preservation of Stone.

DR. ROBERT, in *Le Monde*, for November 11, proves that the decay of stone, granite, marble, limestones, sandstones—in a word, all natural building stones—is the effect of a concurrence of various causes, and that among these a very minute lichen, the *Lepra antiquitatis*, is one of the worst enemies of stone; and this to such an extent that, for instance, the beautiful marble sculptures of the well-known Parc de Versailles, will, unless proper measures are taken for staying the process of decay, be unsightly and ugly masses of dirt, and quite irretrievably lost as works of art within another fifty years. The author, taking as instances such buildings at Paris as the Bourbon Palace, the Palais du Corps Législatif, the Mazarin Palace, (*l'Institut*), the Mint, and others, points out that dust, spider's-webs, and the action of rain, combine with the minute lichen above alluded to, to call forth the decay of stone, especially of such parts, first, where any sculpture or ornamental carving promotes the deposition of dirt and dust. The author conclusively proves (and brings on instances which every one can see, and which, moreover, are important, in consequence of the length of time which has elapsed since the protective action of the black oxide and salts of copper commenced), that the action of the two last-named substances is, undoubtedly, preservative to stone. In reference to granite, the author states that (and an instance thereof can be seen at Waterloo bridge) this stone is, also, according to the experience of Egyptian engineers, far more readily affected by a moist climate than one would be led to believe. The obelisk of Luxor, brought from Upper Egypt to Paris, has become blanched and full of small cracks during the forty years it has stood on the Place de la Concorde, while forty centuries had not perceptibly affected it as long as it was in Egypt. Granite, in a moist clime, becomes the seat of a microscopically-small cryptogamic plant, which greatly aids destruction; and it is, moreover, a well-known fact, that the disintegration of this stone, consisting of three separate minerals (quartz, mica, and felspar,) depends very greatly upon the thorough and intimate mixture, as well as upon the chemical composition, of the same, each of these minerals, separately, being readily enough weathered.

Production of Oxygen.

Mr. R. J. FOWLER, in the *British Journal of Photography*, says that five hundred pounds of manganate of soda furnish two and a-half cubic yards of oxygen every hour. This charge is placed in a retort, and superheated steam passed over it; in five minutes all the oxygen is extracted from this quantity of the salt. Hot air passed over this residue for five more minutes restores all the oxygen given up, and the result of an hour's continuous work, or six extractions of oxygen and six re-oxidations, is two and a-half cubic yards of oxygen. This oxygen, when it issues from the gasometers, contains about fifteen per cent of nitrogen, but, by letting the first portions escape, the quantity of this mixture can be reduced to two and a-half per cent. M. TESSIE DU MOTHAY affirms that one ton of manganate of soda will yield one hundred cubic yards of oxygen daily, or more than 36,000 per year, and this without having to renew the salt once.

A Large Mining Syphon.

MR. G. A. TREADWELL has a mining syphon at Gravel Range, Toulomne county, Cal., 1,000 feet long and four inches in diameter, made of galvanized iron. The head of the syphon is sunk eighteen feet down a pit in a tunnel, and the descent from the highest point to the foot is forty feet, giving a difference of twenty-two feet between the levels of the two ends. The current is so strong that gravel an inch in diameter is carried out. The pipe leaks a little, so that once a day it must be filled by a force pump.

Endless Rope Railroads for Mines.

A CORRESPONDENT of the Michigan *Mining Gazette*, speaking of the endless rope railroad at the Calumet copper mine, says: "This mine is probably working the longest endless rope railroad in the country, namely, from the kiln and rock-breaking house to the steam mill, a distance of 2,230 feet, over which all the stamp-rock produced by the break is delivered, and it is needless to say, has capacity to deliver twice as much more."

THE San Francisco *Bulletin* urges the Legislature of California to petition Congress to make immediate provision for the survey and sale of all the public lands in the mining counties of that State.

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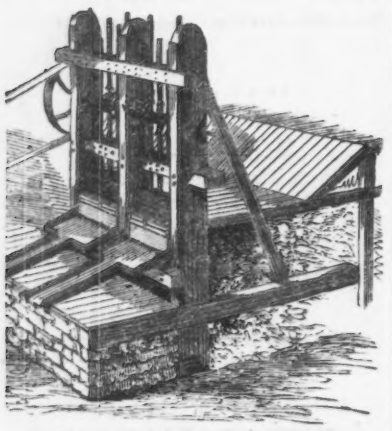

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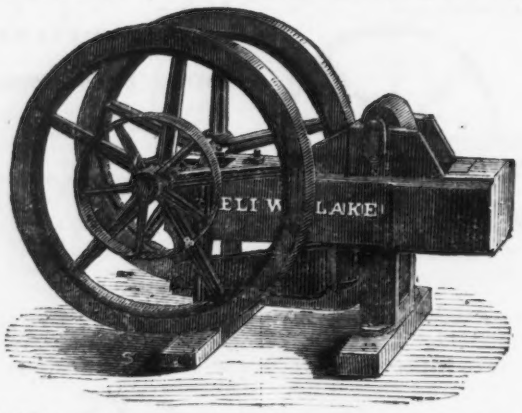

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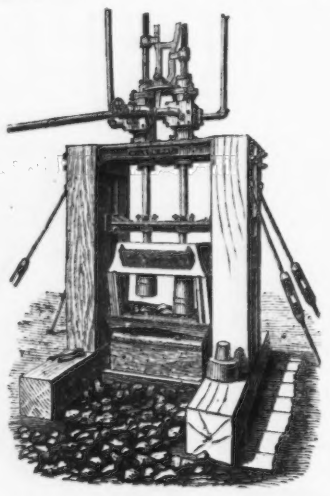

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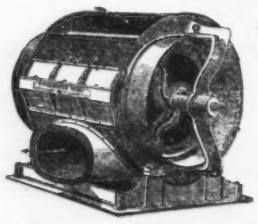

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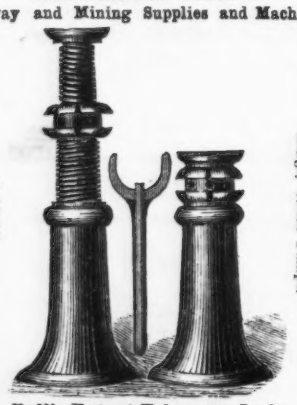

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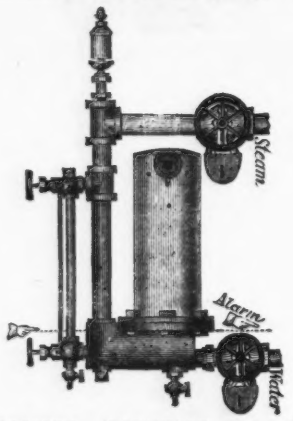

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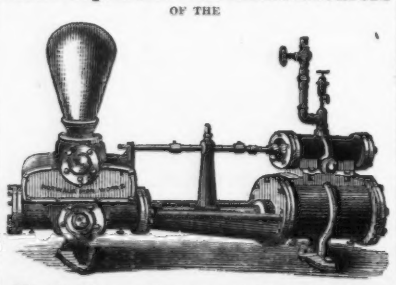

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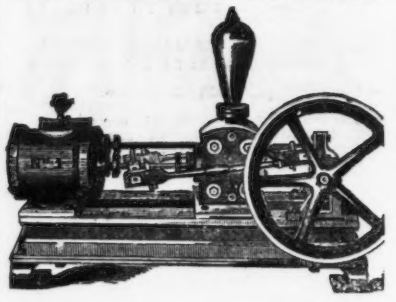

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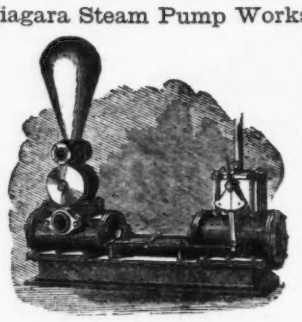

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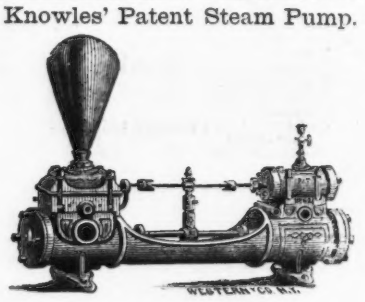

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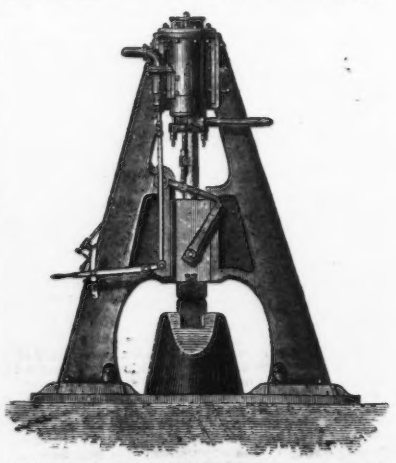

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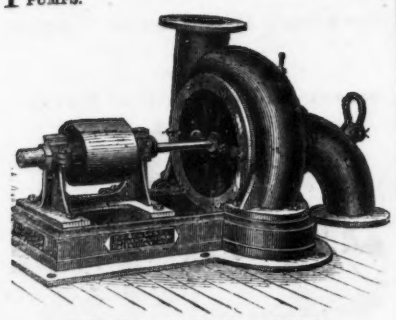

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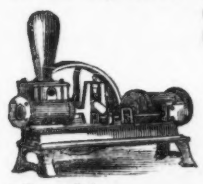

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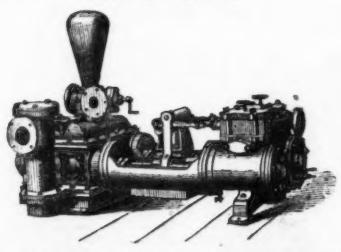

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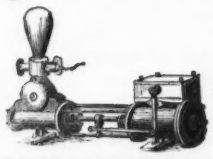

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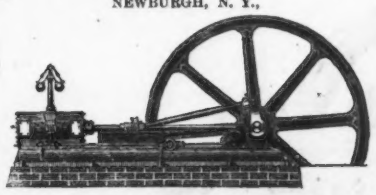

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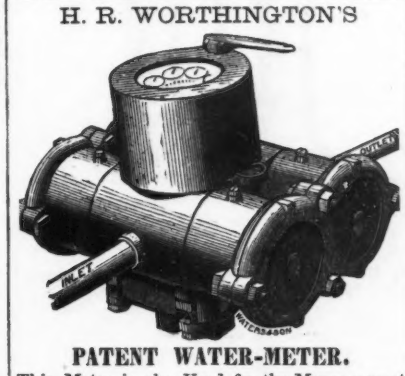

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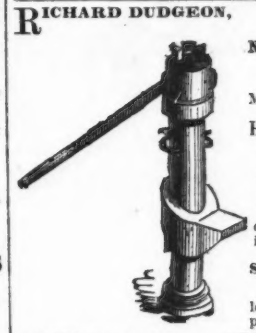

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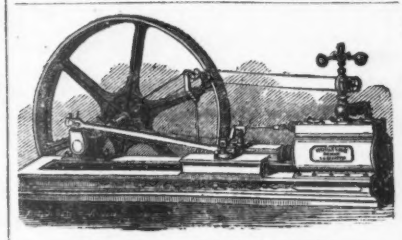

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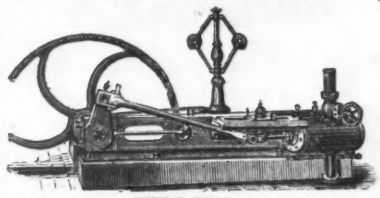

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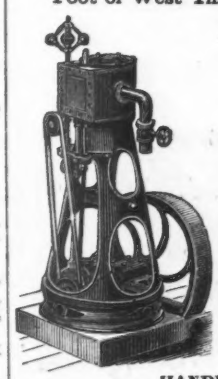

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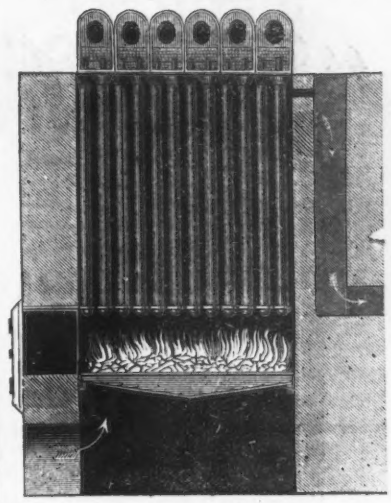

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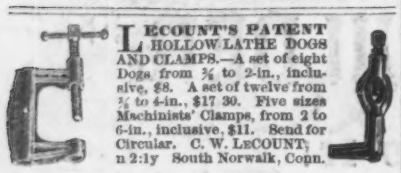

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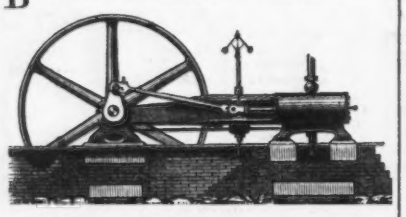

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